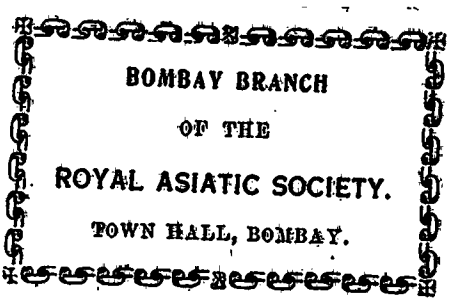
Annual Report of the

Public Health Commissioner

with the Government of India

1938 - 1940



Digitized with financial assistance from

Government of Maharashtra

on 01 February, 2020

$\frac{26}{52}$

$\frac{}{4}$

58

FEB 17 1941

HC. 2. 38
1200

ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1938 / 1939 & 1940

ROYAL ASIATIC SOCIETY
LIBRARY
OF THE
BOMBAY
BRANCH
OF THE

With Appendices

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI.
1941

Price Rs. 2 or 3s.

221 / FLI

HC. 2. 38
1200

ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1938

134481

With Appendices

26 / 52 / 4

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI.
1940

List of Agents in India and Burma from whom Government of India Publications are available.

ABBOTTABAD—English Book Store.
AGRA—
English Book Depot, Taj Road.
Indian Army Book Depot, Dayalbagh.
National Book House, Jeonamandi.
AHMEDABAD—
Chandrakant Chimanlall Vora.
H. L. College of Commerce, Co-operative Store Ltd.
AJMER—Banthiya & Co., Ltd., Station Road.
ALIGARH—Rama Book Depot, Sarai Hussain.
ALLAHABAD—
Kitabistan, 17-A, City Road.
Ram Narain Lal, 1, Bank Road.
Superintendent, Printing and Stationery, U. P.
Wheeler & Co., Messrs. A. H.
BARODA—Parikh & Co., Messrs. B.
BILASPUR—Subhan, Mr. M. A., Bookseller & Publisher.
BOMBAY—
Bombay Book Depot, Charni Road, Girgaon.
Joshi, Mr. V. G., News Agent, Devgad Baria, *via* Piplod.
New Book Co., Kitab Mahal, 188-90, Hornby Road.
Popular Book Depot, Grant Road.
Shri Samarth Book Depot, Ramchandra Buildings, Near Portuguese Church, Girgaon.
Superintendent, Govt. Printing & Stationery, Queen's Road.
Taraporevala Sons & Co., Messrs. D. B.
Thacker & Co., Ltd.
Tripathi & Co., Messrs. N. M., Princess Street, Kalbadevi Road.
Wheeler & Co., Messrs. A. H.
CALCUTTA—
Book Company.
Chatterjee & Co., 3 Bacharam Chatterjee Lane.
Chukervertty, Chatterjee & Co., Ltd., 13, College Square.
Das Gupta & Co., 54/3, College Street.
Hindu Library, 137-F, Balaram De Street.
Lahiri & Co., Ltd., Messrs. S K.
Macmillan & Co., Ltd., 294, Bow Bazar Street.
Newman & Co., Ltd., Messrs. W.
Roy Chowdhury & Co., Messrs. N. M., 72, Harrison Road.
Sarcar & Sons, Messrs. M. C., 15, College Square.
Sarkar & Sons, Ltd., Messrs. S. C., 1-1-1C., College Square.
Standard Law Book Society, 79/1, Harrison Road.
Thacker, Spink & Co. (1933), Ltd.
Wheeler & Co., Messrs. A. H.
CAWNPORE—
Advani & Co., P. O. Box No. 100.
Standard Book Depot, The Mall.
CUTTACK—Press Officer, Orissa Secretariat.
DEHRA DUN—Ideal Book Depot, Rajpur Road.
DELHI—
Imperial Book Depot and Press, Near Jama Masjid (Machhliwalan).
Indian Army Book Depot, Daryaganj.
Jaina & Bros., Messrs. J. M., Morigate.
Oxford Book and Stationery Co.
Pioneer Book Supply Co., 219, Cloth Market.
Sharada Mandir Ltd., Nai Sarak.
Young Man & Co., (Regd.), Egerton Road.
DERAKOTTAH—Rajaji Press Ltd.
DHARWAR—Karnataka Sahitya Mandir, Publishers and Direct Importers.
DUM DUM CANTT.—Bengal Flying Club.†
FEROZEPUR—English Book Depot.
GWALIOR—Jain & Bros., Messrs. M. B., Sarafa Road.
HYDERABAD (DECCAN)—Hyderabad Book Depot, Chaderghat.
JAIPUR CITY—Goyal & Goyal, Publishers & Booksellers.
JODHPUR—Mathur & Co., Messrs. B. S., Chatter Vilas, Paota, Civil Lines.
JUBBULPORE—C. P. Circulating Library and Book Depot, Civil East Street, Cantonment.
KARACHI—
Aero Stores.
English Bookstall.
Standard Bookstall.
KARACHI (SADAR)—Manager, Sind Government Book Depot and Record office.
KARAIKUNDI—Rajaji Press, Ltd.
KASHMIR—Rainas News Agency, The Bund, Sri Nagar.
KOLHAPUR—International Bookstall, Market.
LAHORE—
Eastern Publishing and Stationery, Ltd., 10, Chamberlain Road.
Imperial Publishing Coy.
Kansil & Co., Messrs. N. C., 9, Commercial Buildings, The Mall.
Malhotra & Co., Messrs. U. P., Post Box No. 94.
Minerva Book Shop, Anarkali Street.
Modern Times, Moheni Road.
Punjab Religious Book Society.
Punjab Sanskrit Book Depot.
Rama Krishna & Sons, Anarkali.
Standard Book Depot.
Superintendent, Govt. Printing, Punjab.
Times Book Depot, Mohan Lal Road.
University Book Agency, Kacheri Road.
LUCKNOW—
Lucknow Publishing House.
Upper India Publishing House, Ltd., Literature Palace, Aminuddaula Park.
LYALLPORE—Lyall Book Depot.
MADRAS—
Company Law Institute, Thyagarayanagar.*
Higginbothams.
Little Flower & Co., 44, Lingha Chetty Street, G. T.
Superintendent, Govt. Press, Mount Road.
Varadachary & Co., Messrs. P.
MEERUT—
Ideal Book Depot, Big Bazar.
Parakash Educational Stores, Near Tehsil.
MOGA—Army Musketry Stores.
NAGAPATAM—Venkataraman, Mr. B.
NAGPUR—
Chiney & Sons, Booksellers, etc., Dhantoli.
Superintendent, Govt. Printing, Central Provinces.
NEW DELHI—
Bhawnani & Sons.
Delhi and U. P. Flying Club, Ltd.†
Idandas Book Co., Connaught Circus (opposite Scindia House).
Jaina & Bros. Messrs. J. M., Connaught Place.
Ramesh Book Depot & Stationery Mart, Connaught Place.
Saraswati Book Depot, 15, Lady Hardinge Road.
PATNA—
Superintendent, Government Printing, Bihar, P. O. Gulzarbagh.
Verma's Cambridge Book Depot.
PATNA CITY—
Agarwala & Co., Messrs. J. N. P., Padri-ki-Haveli.
Raghunath Prasad & Sons.
PESHAWAR—
British Stationery Mart.
London Book Co. (India), Arbab Road.
Manager, Govt. Printing & Stationery, N.-W. F. P.
PESHAWAR CANTT.—Faqir Chand Marwah.
POONA—
Dastane Bros., Home Service, 456, Rawiwar Peth.
International Book Service.
Ram Krishna Bros., Opposite Bishram Bagh.
QUETTA—Standard Bookstall.
QUILON—Associated News Agency, Big Bazar.
RAJKOT—Mohanlal Dossabhai Shah.
RANGOON—Burma Book Club, Ltd.
RAWALPINDI—Ray & Sons, Messrs. J., 43, K. & L. Edwardes Road.
RAZMAK—Tara & Sons, Messrs. B. S.
SHILLONG—Superintendent, Assam Secretariat Press.
SIALKOT CANTT.—Modern Book Depot, Bazar Road.
SIALKOT CITY—Buckingham & Co., Booksellers & Stationers, Greenwood Street.
TRICHINOPOLY FORT—Krishnaswami & Co., Messrs. S., Teppakulam.
TRIVANDRUM—Booklovers' Resort, Talkad.
VELLORE—Venkatasubban, Mr. A., Law Bookseller.

*Agents for Income-tax, Law and allied Publications only.
†Agents for Publications on Aviation only.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1938

TABLE OF CONTENTS

SECTION I.

ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1938

PARA.		PAGE
1.	Introduction	1
2.	Population	2
3.	Livebirths	4
4.	Deaths	7
5.	Infantile mortality	9
6.	Mortality among children	13
7.	Stillbirths	15
8.	Registration and compilation of vital statistics	15
9.	Rainfall	16
10.	Agricultural conditions	18
11.	Famine relief	19
12.	Indian States	20

SECTION II

HISTORY OF THE CHIEF DISEASES

13.	Introduction	24
14.	Cholera	24
15.	Plague	33
16.	Smallpox	35
17.	Fevers	40
18.	Malaria	42
19.	Dysentery and diarrhœa	53
20.	Respiratory diseases	53
21.	Tuberculosis	54
22.	Hookworm disease	57
23.	Leprosy	58
24.	Yaws	62
25.	Kala-azar	62

SECTION III

MATERNITY AND CHILD WELFARE

PARA.		PAGE.
26.	Introduction	65
27.	Maternal mortality	66
28.	Midwifery services	70
29.	Infant and child welfare	71
30.	Child welfare work	72
31.	Health schools	74

SECTION IV

THE HEALTH ACTIVITIES OF PROVINCIAL GOVERNMENTS AND SOME OTHER HEALTH ADMINISTRATIONS.

32.	Introduction	76
33.	School health and medical inspection of school children	76
34.	Fairs and festivals	82
35.	Health propaganda	85
36.	Food Adulteration	88
37.	Housing	92
38.	Industrial hygiene and health of the industrial population	95
39.	Railways	97

SECTION V

INTERNATIONAL HEALTH AND PORT HEALTH ADMINISTRATION

40.	Office International d'Hygiene Publique, Paris	104
41.	Singapore Bureau, League of Nations, Health Organisation	108
42.	Health Organisation of the League of Nations, Geneva	109
43.	The Indian Delegation to the 19th (Ordinary) Session of the Assembly of the League of Nations	111
44.	First International Congress of Leprosy	112
45.	Third International Congress of Tropical Medicine and Malaria	113
46.	Port health administration	114

SECTION VI

VACCINATION AGAINST SMALLPOX.

47.	Vaccination and revaccination statistics	119
48.	Compulsory vaccination	122
49.	Vaccine institutes and supply of vaccine	123
50.	Indian States.	124

SECTION VII

PUBLIC HEALTH WORKS

PARA.		PAGE.
51.	General	130
52.	North-West Frontier Province	132
53.	Punjab	133
54.	Delhi	134
55.	United Provinces	135
56.	Orissa	136
57.	Bengal	136
58.	Central Provinces	137
59.	Bombay	137
60.	Sind	138
61.	Madras	138
62.	Assam	139

SECTION VIII

LABORATORIES AND MEDICAL RESEARCH

63.	Central Research Institute, Kasauli	140
64.	All-India Institute of Hygiene and Public Health, Calcutta	141
65.	School of Tropical Medicine, Calcutta	144
66.	Haffkine Institute, Bombay	146
67.	King Institute of Preventive Medicine, Guindy	147
68.	King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong	148

INDIAN RESEARCH FUND ASSOCIATION

69.	General	148
70.	Cholera	148
71.	Malaria	148
72.	Nutrition	150
73.	Leprosy and plague	152
74.	Rabies	152
75.	Tuberculosis	152
76.	Indigenous drugs	153
77.	Maternal mortality	154
78.	Miscellaneous	155
79.	Research work in medical colleges	160

PASTEUR INSTITUTES

80.	Pasteur Institute of India, Kasauli	162
81.	Pasteur Institute, Calcutta	162
82.	Pasteur Institute, Patna	162
83.	Pasteur Institute of Southern India, Coonoor	163
84.	Pasteur Institute, Bombay	163
85.	Pasteur Institute, Shillong	164

SECTION IX

HEALTH OF JAILS IN INDIA

Para.		Page.
86.	General	165
87.	Jails of all classes	165
88.	District and central jails	170
89.	Special remarks on provinces	172
90.	Andamans	175
91.	Conclusion	177

SECTION X

VOLUNTARY ORGANISATIONS

92.	General	178
93.	Indian Red Cross Society	178
94.	British Empire Leprosy Relief Association (Indian Council)	181
95.	Mission to Lepers	182
96.	The International Health Division of the Rockefeller Foundation	183
97.	Voluntary Organisations in Bombay Presidency	185
98.	Health Propaganda Board, Madras	185
99.	The Central Co-operative Antimalaria Society, Bengal.	185
100.	Bengal Health Welfare Committee	186
101.	The Association for the prevention of Blindness, Bengal	186

Appendices I —VIII (see details on page 189 *et seq*).

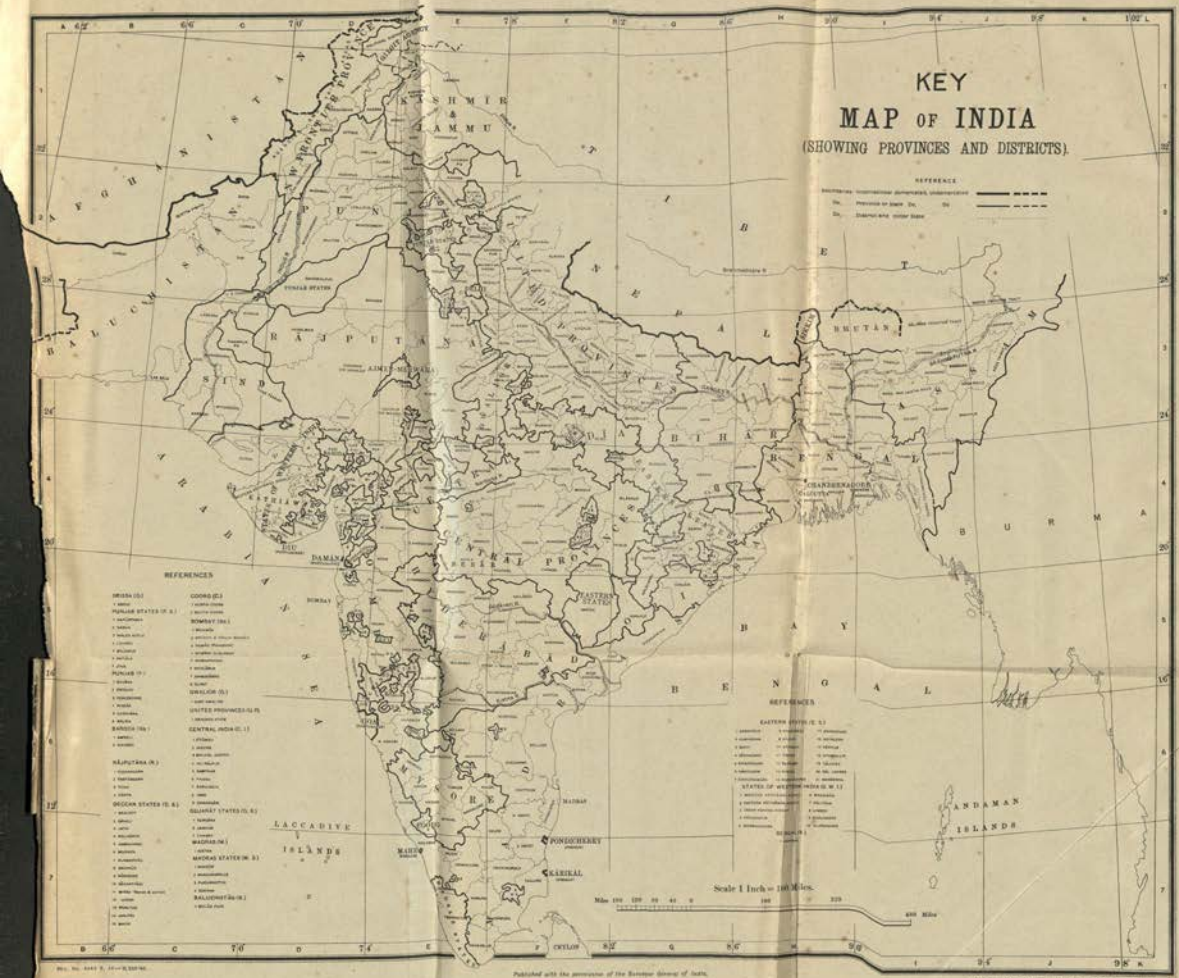
LIST OF ILLUSTRATIONS

MAPS — Facing page

1. Key map of India showing provinces and districts. 1
2. Map showing geographical distribution of cholera in Asia 1930-38. . . 24
3. Map showing the distribution of cholera mortality in India during 1938. 27
4. Map showing the distribution of plague mortality in India during 1938. 33
5. Map showing the distribution of smallpox mortality in India during 1938. 37

CHARTS, GRAPHS, ETC.

1. Chart showing a comparison of birth, death and infantile mortality rates of India with those of other countries in 1938. 2
2. Chart showing infantile mortality *per mille* of livebirths in British India during 1938. 10
3. Comparative diagrams of deaths by causes in British India during 1938 and the decennial mean 1929-38. 24
4. Diagrams showing the rates of cholera mortality *per mille* of the population during the period 1877-1938. 25
5. Graph showing cholera deaths by months in British India, excluding Burma during 1934-38. 26
6. Graph showing monthly plague mortality rates per 100,000 of estimated population in British India, excluding Burma, during 1924-38. . . 34
7. Graph showing smallpox deaths by months in British India, excluding Burma, during 1934-38. 36
8. Graph showing the mean monthly death rates *per mille* from dysentery and diarrhœa amongst British other ranks and Indian Officers and Indian other ranks during 1932-38. 53
9. Vaccination chart showing percentages of successful cases to total operations during 1938-39. 121


KEY
MAP OF INDIA
(SHOWING PROVINCES AND DISTRICTS).
REFERENCE
KASHMIR & JAMMU
PUNJAB
RAJPUTANA
SIND
BALUCHISTAN
AFGHANISTAN
NEPAL
BHUTAN
ASSAM
BENGAL
BIHAR
BURMA
BOMBAY
CENTRAL PROVINCES
EASTERN STATES
MADRAS
MYSORE
COORG
HYDERABAD
BARODA
DAMAN
CHANDERNAGORE
PONDICHERRY
KARIKAL
MAHE
LACCADIVE ISLANDS
ANDAMAN ISLANDS
CEYLON
BAY OF BENGAL
ARABIAN SEA
REFERENCES
Scale 1 Inch = 100 Miles.
Miles 100 0 100 200 300
400 Miles
Published with the permission of the Surveyor General of India.
PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA.

Annual Report of the Public Health Commissioner with the Government of India for 1938

SECTION I

ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1938

Introduction

1. The annual report of the Public Health Commissioner has been published hitherto in two volumes, the first dealing with the health of the civil population and the second with the health of the Army in India. With effect from the year under review the report on the health of the Army will be issued by the Director of Medical Services in India and the Public Health Commissioner's report will, for the future, confine itself to a survey of the health conditions of the civil population.

The principal vital statistics of British India for the year 1938 are given below and corresponding figures for the previous year and for the quinquennium, 1933-37, are also given for the purpose of comparison.

	1938.	1937.*	Average of 1933-37.*
Mid-year estimated population	275,540,813	272,406,436	266,090,905
Density per square mile	361	358	350
Births — Number	9,398,011	9,388,457	9,298,989
Births — Rate *per mille*	34·1	34·5	34·9
Deaths — Number	6,685,120	6,112,375	6,206,468
Deaths — Rate *per mille*	24·3	22·4	23·3
Infantile death rate per 1,000 live-births.	167·1	161·7	167·9
Vital index	140·6	153·6	149·8

A comparison of the birth, death and infantile mortality rates indicates that no wide fluctuations of these rates have occurred during the period, 1933 to 1938. As regards the general death rate a slight rise of 1·9 *per mille* was recorded in 1938 as compared with the previous year, which is partly accounted for by the fact that a widespread epidemic of cholera swept over large tracts of Northern and Central India after the Hardwar pilgrim festival in April 1938. While the mortality from cholera rose from 99,054 in 1937 to 236,143 in 1938, the deaths from smallpox and plague decreased from 54,810 and 28,169 to 39,844 and 17,371 respectively. The combined effect of these three diseases was an increase of mortality to the extent of 111,325 over that of the previous year. It must however be remembered that, although the incidence of these diseases is correctly regarded as an index of the health and environmental conditions of a community, their joint contribution to the total mortality of the country is relatively small; for instance, during the decennium 1928-37, deaths from these three diseases constituted only 5·2 per cent

*As Burma was separated from India on 1st April 1937, the figures are exclusive of Burma.

of the mortality from all causes. On the other hand during the same period the undefined groups, 'fevers', 'all other causes' and 'respiratory diseases' contributed 57·8 per cent, 26·0 per cent and 7·0 per cent respectively to the total number of deaths. These are large groups consisting of, in each case, a complex collection of diseases whose disentanglement is impossible under the existing defective methods of registration of vital statistics. Under the heads 'fevers' and 'respiratory diseases' appreciable proportions of the recorded deaths are undoubtedly due to malaria, tuberculosis and enteric fever, but no true picture of the relative incidence of these diseases is available. Such information is essential for the organisation of preventive work, and one of the most urgent tasks for health authorities in India is that of widening and speeding up their field of effort towards producing more accurate registration and compilation of vital statistics.

Table I (*i*) provides a comparison of the birth, death and infantile mortality rates of British India with those of certain other countries. With the exception of Japan, the other countries of the Middle and Far East, for which figures are given, show no very marked superiority over India in respect of the general and infantile mortality rates.

TABLE I (*i*).

	Birth rate per 1,000 population.	Death rate per 1,000 population.	Infant mortality per 1,000 live births.	Maternal mortality per 1,000 live births.
British India	**34·1**	**24·3**	**167**	**20***
England and Wales	15·2	11·7	52	3·1
Federated Malay States	39·7	19·1	147	8·6
Japan (For 1937)	30·6	17·0	106	2·5
Palestine	41·5	18·9	153	Not available
Egypt (For 1937)	Not available	27·2	165	Not available
Netherlands East Indies	30·9	20·2	Not available	4·0†

Population.

2. A comprehensive view of the growth of population in India and of birth and death rates since 1871 is given below in Table I (*ii*) :—

TABLE I (*ii*).

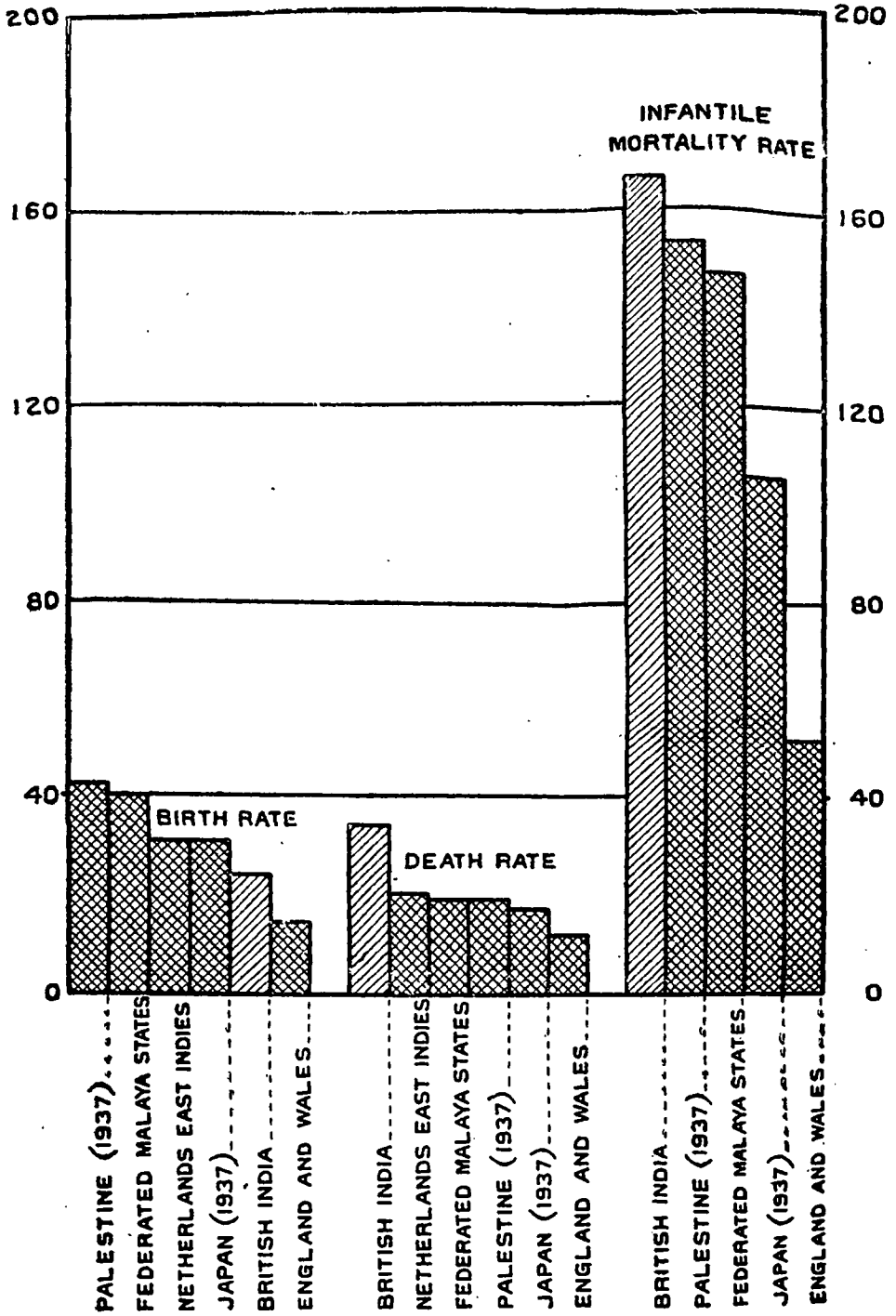
	Annual number of births.	Birth rate *per mille*.‡	Annual number of deaths.	Death rate *per mille*.‡	Annual excess of births over deaths.
1871—1880	Not available	Not available	3,540,202	19	Not available
1881—1890	4,565,687	23	5,058,578	26	492,891
1891—1900	7,174,694	33	6,662,417	31	512,277
1901—1910	8,591,136	37	7,657,513	33	933,623
1911—1920	8,810,018	37	8,142,364	34	667,654
1921—1930	8,345,364	33	6,347,063	25	1,995,301
1931	8,814,836	35	6,404,990	25	2,409,846
1932	8,718,620	34	5,596,246	22	3,122,374
1933	9,317,918	36	5,870,336	23	3,447,582
1934	8,923,169	34	6,606,697	25	2,316,472
1935	9,299,021	35	6,331,576	24	2,967,445
1936	9,566,379	36	6,111,358	23	3,455,021
1937	9,388,457	35	6,112,375	22	3,276,082
1938	**9,398,011**	**34**	**6,685,120**	**24**	**2,712,891**

*An estimate made by the Special Committee of the Central Advisory Board of Health on Maternity and Child Welfare Work in India (1938).

†Relates to Europeans.

‡ These rates are based on populations estimated for the middle of each period.

COMPARISON OF BIRTH, DEATH AND INFANTILE MORTALITY RATES OF INDIA WITH THOSE OF OTHER COUNTRIES IN 1938



Note:-Infantile mortality rate for Netherlands East Indies is not available.

If we confine our attention to the figures relating to the present century on the assumption that defectiveness of registration of vital statistics would be relatively less in this period than before 1900, the first three decades of this century have witnessed uneven rates of growth as evidenced by the average annual excess of births over deaths. The lowest figure is for the decennium, 1911-1920, and this is due to the fact that the influenza epidemics of 1918 and 1919 caused abnormally high death rates in the population. The succeeding decade, 1921-30, recorded an average increase of nearly two millions every year while, for the eight years of the present decennium, the average figure was approximately three millions. It will thus be seen that, from 1921 onwards, there has been a steady increase in the population of the country.

The estimated mid-year populations of British India and of the provinces for 1938 are shown in Table I (*iii*). For the purpose of comparison the corresponding figures for 1937 are also given. The last two columns show the percentage rates of increase or decrease during 1938 and for the period that has elapsed after the census of 1931.

TABLE I (*iii*).

	Estimated population on 30th June 1937.	Estimated population on 30th June 1938.	Percentage increase or decrease.	Total percentage increase from 1st March 1931 (last census) to the end of June 1938.
British India .	**272,406,436**	**275,540,813**	**1·15**	**8·65**
N.-W. F. P. .	2,523,589	2,539,059	0·61	7·65
Punjab . .	26,069,627	26,597,656	2·03	13·37
Delhi . .	699,157	715,419	2·33	12·44
U. P. . .	52,390,009	52,994,705	1·15	9·47
Bengal . .	52,195,805	52,583,541	0·74	5·38
Bombay . .	19,383,756	19,620,735	1·22	9·53
Sind . .	4,237,554	4,265,564	0·66	
Bihar . . .	34,095,892	35,084,665	0·03	8·71
Orissa . .	7,209,846	7,251,906	0·58	
C. P. . .	16,604,896	16,748,481	0·86	
Madras . .	47,201,665	47,872,410	1·42	
Coorg . .	164,619	164,109	—0·31	0·48
Assam . .	8,438,246	8,506,974	0·81	7·32
Ajmer-Merwara	591,775	595,589	0·64	6·30

On 1st April 1936 the province of Orissa was formed from territories taken from the provinces of Madras, the Central Provinces and Bihar and Orissa while the province of Sind was created by its separation from Bombay Presidency. Detailed information regarding the vital statistics of the areas constituting the new provinces for the period prior to their formation is not available. These facts have necessitated, in certain cases, the presentation in the last column of this table, of combined rates of growth for areas much larger than those of individual provinces. To this extent, therefore, the picture of population growth in the provinces lacks precision. Even so, the figures show wide variation in the rates of growth. For instance, while Bengal

registered an increase of 5·38 per cent during the period of seven years and four months after the 1931 census, the Punjab had an increase of 13·37 per cent, closely followed by Delhi with its rate of 12·44 per cent. From the biological point of view it is justifiable to hold that the rate of growth of population over an extended period measures the balance of the favourable and adverse factors associated with the survival of a community. The difference between the rates of the provinces may therefore be indicative, at least in part, of the varying levels of health of the populations concerned.

Table I (*iv*) sets out the age and sex distributions of the estimated population for 1938. These figures have been calculated on the assumption that the age and sex distributions shown at the 1931 census hold good for 1938. The use of recorded births and deaths for working out these populations was ruled out because of their inaccuracy in respect of completeness of figures and, with regard to deaths, in respect of the registered ages at death.

TABLE I (*iv*).

	Males.	Females.	Total.
All ages	141,922,596	133,618,217	275,540,813
0—5 years	20,715,050	21,149,081	41,864,131
5—10 ,, ...	18,830,617	17,095,129	35,925,746
10—15 ,, ...	16,960,870	14,919,689	31,880,559
15—20 ,, ...	12,501,088	12,442,451	24,943,539
20—30 ,, ...	25,057,984	24,913,843	49,971,827
30—40 ,, ...	20,473,958	18,234,192	38,708,150
40—50 ,, ...	13,813,469	11,996,561	25,810,030
50—60 ,, ...	7,981,056	7,303,855	15,284,911
60 years and upwards . .	5,588,504	5,563,416	11,151,920

Live births.

3. The total number of live births registered in British India during 1938 was 9,398,011, an increase of 9,554 over the figure for 1937. The birth rates *per mille* of the estimated populations for 1937 and 1938 were 34·5 and 34·1 respectively. The rates for British India and the provinces are given below in Table I (*v*). Inaccuracy of registration is mainly responsible for the low rate of 18 *per mille* (Sind). In the first place birth rates well over 40 *per mille* have been recorded, as may be seen from this table, in the Punjab and Delhi. Secondly, careful investigations carried out in Madras Presidency have shown that the average rate for the province is in the neighbourhood of 42 *per mille*. It is therefore almost certain that defective registration is responsible for the low rate recorded in Sind. In this province, since its creation in 1936, the birth rates were 19, 18 and 18 *per mille* for the successive years 1936, 1937 and 1938. This question deserves therefore careful investigation by the health authorities of that province.

Urban and rural birth rates for British India and the provinces are given in Table C of Appendix I. The rates for British India were 39·5 and 33·5 *per mille* respectively for the two types of areas. In the provinces the urban

rate varied from 18·4 *per mille* in Bihar to 63·3 in Madras Presidency. For the rural areas, Sind recorded the lowest rate of 14·4 *per mille* and Delhi the highest, 54·8 *per mille*.

TABLE I (*v*).

	Births.			Rate *per mille*		No. of males born per 100 females in 1938.
	Male.	Female.	Total.	1938	1937	
British India	4,883,719	4,514,292	9,398,011	34·1	34·5	108
N.-W. F. P.	41,267	30,710	71,977	28	29	134
Punjab	615,125	550,712	1,165,837	44	42	112
Delhi	17,665	16,475	34,140	48	45	107
U. P.	945,068	836,050	1,781,118	34	33	113
Bihar	571,091	545,087	1,116,178	32	32	104
Orissa	122,328	116,469	238,797	33	34	105
Bengal	788,538	732,716	1,521,254	29	33	108
C. P.	340,412	321,373	661,785	40	38	106
Bombay	389,622	368,873	758,495	39	38	106
Sind	43,445	33,824	77,269	18	18	128
Madras	873,709	835,836	1,709,545	36	36	105
Coorg	1,981	1,804	3,785	23	24	110
Assam	122,346	114,834	237,180	28	29	107
Ajmer-Merwara	11,122	9,529	20,651	35	37	117

The abnormally high ratios of male to female births in certain provinces have already been commented upon in previous reports. The figures quoted by Newsholme for a number of European countries show a much smaller range of variation, the largest and smallest figures quoted by him being 106 and 103 males to 100 female children born. When countries like England and Italy, which are racially different, show only relatively small differences in the ratio, it is doubtful whether the much larger variations found in India can be explained in terms of racial difference alone. Further, the fact that some provinces, such as N.-W. F. P., the Punjab, U. P., Sind and Ajmer-Merwara, report high figures year after year seems to suggest that omission to register female births is more common in these provinces than in others.

A birth rate based on the female married population at the reproductive age period gives a clearer indication of the fertility of women in the country than the crude birth rates given in the previous tables. Information regarding marriage is available only from the census enumerations at 10-yearly intervals. On the assumption that the proportions of married women at the 1931 census for the respective provinces are applicable to 1938, the rates given below in Table I (*vi*) are based on female populations aged 15—40 years, which period covers the greater and the most fruitful part of a woman's reproductive life.

TABLE I (*vi*).

	Female population 15-40 years.	Total births.	Rate *per mille* based on total female population, 15-40 years.	Rate *per mille* based on married female population 15-40 years.
British India . .	**55,590,486**	**9,398,011**	**169·1**	**201·5**
N.-W. F. P. . . .	483,371	71,977	148·9	185·0
Punjab	4,719,896	1,165,837	247·0	293·5
Delhi	134,960	34,140	253·0	287·0
U. P.	10,401,221	1,781,118	171·2	195·7
Bihar	7,140,798	1,116,178	156·3	181·2
Orissa	1,665,033	238,797	143·4	
Bengal	10,896,519	1,521,254	139·6	169·2
C. P.	3,432,124	661,785	192·8	217·6
Bombay	3,947,153	758,495	192·2	207·3
Sind	810,930	77,269	95·3	
Madras	10,115,657	1,709,545	169·0	213·4
Coorg	33,339	3,785	113·5	156·5
Assam	1,694,277	237,180	140·0	172·5
Ajmer-Merwara . .	115,208	20,651	179·2	202·9

The fact that births tend to occur more frequently at certain parts of the year than at others has long been recognised. The figures for births distributed according to the four quarters of the year are given below in table I (*vii*).

TABLE I (*vii*).

	1st quarter.	2nd quarter.	3rd quarter.	4th quarter.
British India	**2,308,158**	**2,100,959**	**2,353,721**	**2,635,173**
N.-W. F. P.	18,804	15,664	17,616	19,893
Punjab	281,969	230,412	314,469	338,987
Delhi	7,027	6,872	10,041	10,200
U. P.	425,620	366,064	485,910	503,524
Bihar	276,294	258,967	275,531	305,386
Orissa	57,598	66,482	57,030	57,687
Bengal	456,195	330,968	265,894	468,197
C. P.	157,257	154,153	173,872	176,503
Bombay	177,834	179,079	201,123	200,459
Sind	18,776	14,776	19,742	23,975
Madras	359,751	423,152	470,078	447,564
Coorg	831	989	1,093	872
Assam	65,631	49,213	46,845	75,491
Ajmer-Merwara	4,571	4,168	5,477	6,435

For British India as a whole births were most numerous in the fourth quarter. This holds good for all provinces except Bombay, Madras, Coorg and Orissa. In the first three the period of highest incidence of births is the third quarter while for Orissa it is the second quarter.

Deaths.

4. The total number of deaths registered in British India in 1938 was 6,685,120, an increase of 572,745 over that for the previous year. The death rates *per mille* of the population were 22·4 and 24·3 respectively during 1937 and 1938. The death rates for males and females in British India and the provinces are given in Table I (*viii*). In the Punjab, Delhi, Bengal, Bombay, Coorg, Assam and Ajmer-Merwara the death rate of females exceeded that of males while in the other provinces the reverse was the case. The combined rates for the two sexes show wide disparity among the provinces, the range of variation being from 11·3 *per mille* in Sind to 37·6 in the Central Provinces. The remarks regarding the birth rate in respect of Sind apply equally to the death rate and steps to improve the registration of vital statistics in this province appear to be urgently required. As regards the Central Provinces an examination of the provincial death rates since the beginning of the present decennium shows that the province has consistently recorded the highest rate among the provinces throughout this period, the figure ranging between 30·1 and 37·6. During the same period the death rate in British India varied between 22·4 and 26·9 so that the rates for the Central Provinces have been higher than those of India to the extent of about 34 to 40 per cent. It is clear that the situation demands the serious and urgent attention of the health authorities of the province.

TABLE I (*viii*).

	Deaths.			Death rate *per mille*.		
	Male.	Female.	Total.	Male.	Female.	Total.
British India .	**3,490,496**	**3,194,624**	**6,685,120**	**24·6**	**23·9**	**24·3**
N.-W. F. P. .	29,412	24,570	53,982	21·4	21·1	21·3
Punjab .	332,581	290,118	622,699	23·0	23·9	23·4
Delhi . .	8,561	8,171	16,732	20·8	26·9	23·4
U. P. . .	675,228	574,760	1,249,988	24·3	22·8	23·6
Bihar . .	405,996	357,737	763,733	23·1	20·4	21·8
Orissa . .	103,689	104,897	208,586	30·0	27·7	28·8
Bengal . .	674,968	640,918	1,315,886	24·7	25·4	25·0
C. P. . .	326,750	302,551	629,301	39·1	36·0	37·6
Bombay . .	280,557	266,830	547,387	27·6	28·2	27·9
Sind . .	27,225	20,860	48,085	11·4	11·1	11·3
Madras . .	524,065	507,987	1,032,052	22·1	21·0	21·6
Coorg .	2,129	1,857	3,986	23·5	25·1	24·3
Assam . .	91,611	86,156	177,767	20·5	21·4	20·9
Ajmer-Merwara .	7,724	7,212	14,936	24·4	25·8	25·1

Rural and urban death rates for the provinces are given in Tables G and H of Appendix I. For British India the rural rate was 24·0 *per mille* and the urban rate 26·3 *per mille*.

The influence of age and sex on mortality is a recognised fact and the crude death rates already discussed are not satisfactory for interprovincial comparisons or comparison between different years for the same province because of the varying age and sex compositions of the populations concerned. To remove the influence of the age and sex factors standardised death rates (direct method) based on the total population of India at the 1931 census have

been calculated for the eight years of the present decennium and are given as Table P in Appendix I. It will be seen from this table that the result of standardisation has to show large figures for the death rate in the provinces of N.-W. F. P., Bengal and Coorg. This increase is most marked in Bengal. On the other hand, in the provinces of the Punjab, U. P., C. P., Bombay, Madras and Ajmer-Merwara, the standardised rate is lower than the crude death rate, the difference being most marked in the Punjab and C. P.

Death rates at different age periods for males and females in British India and the provinces are given in Table J of Appendix I. It will be seen from this table that, below 15 years and after 40 women are subject to a lower rate of mortality than men. Between 15 and 40 the death rate among women is higher. This is due to the fact that maternity levies a heavy toll on women in this country. The only exception is the province of Bihar, where throughout life the rates for women are lower than those for men. Table I (*ix*) gives death rates for the two sexes during the period 15-40.

TABLE I (*ix*).

	Deaths, 15-40 years.		Death rates, 15-40 years.	
	Males	Females	Males	Females
British India	**592,574**	**670,646**	**10·2**	**12·1**
N.-W. F. P.	6,025	5,861	11·0	12·1
Punjab	43,184	45,508	7·5	9·6
Delhi	1,283	1,831	6·4	13·6
U. P.	106,810	108,905	9·3	10·5
Bihar	84,391	75,822	12·1	10·6
Orissa	18,406	22,084	12·7	13·3
Bengal	140,727	175,158	12·3	16·1
C. P.	53,170	61,222	15·7	17·8
Bombay	36,971	44,402	8·6	11·2
Sind	5,821	5,520	5·5	6·8
Madras	74,420	96,879	7·9	9·6
Coorg	693	672	15·3	20·2
Assam	19,796	25,578	10·8	15·1
Ajmer-Merwara	877	1,194	6·6	10·4

Bihar has shown lower rates for women at this age period since its separation from Orissa in 1936. In a country like England, with its highly developed service for maternity, women enjoy a lower mortality than men even during the period between 15-40. There is no reason to consider that Bihar is well in advance of the other provinces in India in respect of maternity service. In fact a recent report on maternity and child welfare work in India by a committee of the Central Advisory Board of Health presents figures which show that Bihar is behind many other provinces in regard to this branch of health work. This question of a lower mortality rate for women in Bihar during 15-40 therefore requires early investigation.

In last year's report mention was made of a scheme of verification of the causes of death in Delhi Municipality by a staff of medical men who investigated every death. From the tabular statements given in the report of the Health Officer for 1938 the following figures are quoted :—

DELHI MUNICIPALITY.

	Registered deaths.	Verified deaths.
Malarial fever	4	266
Measles	222	222
Smallpox	81	81
Typhoid fever	410	410
Pneumonias (including broncho-pneumonia)	1,184	2,470
Phthisis	850	850
Puerperal fever	nil	83
Infantile diarrhœa	72	492
Premature birth	9	245

In regard to measles, smallpox, typhoid fever and phthisis the numbers of registered and verified deaths agree. The signs and symptoms of measles and smallpox are widely known to the people and this may explain the agreement in numbers for these diseases, in respect of the two sources of information. As regards typhoid fever and phthisis, the patient is ill, in either case, for fairly long periods and is likely to have sought and obtained medical aid for himself, so that the cause of death given at the time of its registration by the person reporting it, might have been based on medical diagnosis. In regard to the other causes given above, considerable differences exist between the numbers for the registered and the verified deaths. Taking the latter as a closer approximation to truth, it is clear that the rôle of many preventable causes of mortality, such as malaria, puerperal fever, infantile diarrhoea and premature birth, would have been lost sight of if no verifying agency were employed to check up the accuracy of the registered causes of death.

The importance of securing reliable information regarding the cause of death has been stressed repeatedly in these reports and in last year's report certain suggestions for effecting improvement were embodied in the paragraph dealing with the registration and compilation of vital statistics. While it is recognised that considerations of cost stand in the way of providing trained personnel for this work in the rural areas, the desirability of making some advance in respect of urban populations is so great that the example of Delhi Municipality has been quoted in the hope that similar attempts will be initiated in other places also.

Infantile Mortality.

5. Total deaths under one year in British India in 1938 numbered 1,570,196 giving a rate of 167·1 *per mille* of live births as against 161·7 for 1937. Such minor fluctuations from year to year require no explanation. The relative incidence of deaths among infants at different periods of the first year of life is shown in Table I (*x*). Corresponding figures for England and Wales are also given for the purpose of comparison.

TABLE I (*x*).

	Under one month.		One to six months.		Six to twelve months.		Total deaths under one year.	Death rates per 1,000 live births.	
	Number.	% of total.	Number.	% of total.	Number.	% of total.		1938.	1937.
England and Wales		53·7*		29·2†		17·1		52·7	57·6
British India	735,555	46·8	480,135	30·6	354,506	22·6	1,570,196	167·1	161·7
N.-W. F. P.	3,822	34·4	3,846	34·7	3,422	30·9	11,090	154·1	148·6
Punjab	78,528	40·4	56,865	29·2	59,115	30·4	194,508	166·8	163·0
Delhi	1,767	34·6	1,835	35·9	1,508	29·5	5,110	149·7	166·6
U. P.	102,171	38·6	96,618	36·5	65,900	24·9	264,689	148·6	142·3
Bihar	65,476	48·9	41,994	31·4	26,318	19·7	133,788	119·9	115·9
Orissa	25,122	47·4	18,183	34·3	9,683	18·3	52,988	221·9	214·7
Bengal	154,474	55·0	81,640	29·0	44,809	16·0	280,923	184·7	176·2
C. P.	75,780	48.1	46,901	29·8	34,953	22·2	157,634	238·2	218·6
Bombay	49,053	37·1	47,098	35·6	35,949	27·2	132,100	174·2	160·7
Sind	3,527	37·6	3,298	35·2	2,550	27·2	9,375	121·3	118·0
Madras	155,780	54·9	66,658	23·5	61,492	21·6	283,930	166·1	169·8
Coorg	363	57·0	147	23·1	127	19·9	637	168·3	221·7
Assam	18,554	47·5	13,485	34·5	7,018	18·0	39,057	164·7	160.0
Ajmer-Merwara	1,138	26·0	1,567	35·9	1,662	38·1	4,367	211·5	226·1

The death rate for children under one year in England is only 31·5 per cent of that of India. However, in respect of both countries, the proportionate mortality rates at corresponding periods of the first year of life do not show such a marked difference. England has been able to achieve a remarkable saving of infant lives in comparison with India. But the proportion of neonatal deaths to total infantile deaths in England is as high as, if not higher than, what takes place in India. The prenatal causes, which contribute largely to the mortality within the first month of life, are more difficult to control than those which operate adversely on the infant's health during the succeeding eleven months.

Provincial rates vary widely, from 119·9 *per mille* in Bihar to 238·2 in the Central Provinces. The low figure for Bihar is almost certainly due to defective registration. Infant mortality rates for rural and urban areas are given in Table N of Appendix I. For British India the rural rate is 164·2 *per mille* and the urban rate 190·6. It is difficult to determine how far the difference between these two rates is due to defective registration in rural areas or to adverse environmental conditions which town life produces.

Table I (*xi*) gives infantile deaths under one week as a rate *per mille* of live births and as percentages of deaths under one month and of total infant deaths. The corresponding rates for England and Wales show that while, of the total infants born a much smaller percentage dies in the first week of life than in India, the deaths under one week constitute higher proportions of the infantile deaths within the first month as well as of those during the first year than they do in this country. This again emphasises the fact that the success achieved in the saving of infant lives has been more conspicuous by an improvement of the conditions of extra-uterine life for the child rather than of those relating to its prenatal existence.

* Under four weeks.
† Four weeks to six months.

INFANTILE MORTALITY RATE PER MILLE OF LIVE BIRTHS IN BRITISH INDIA DURING 1938

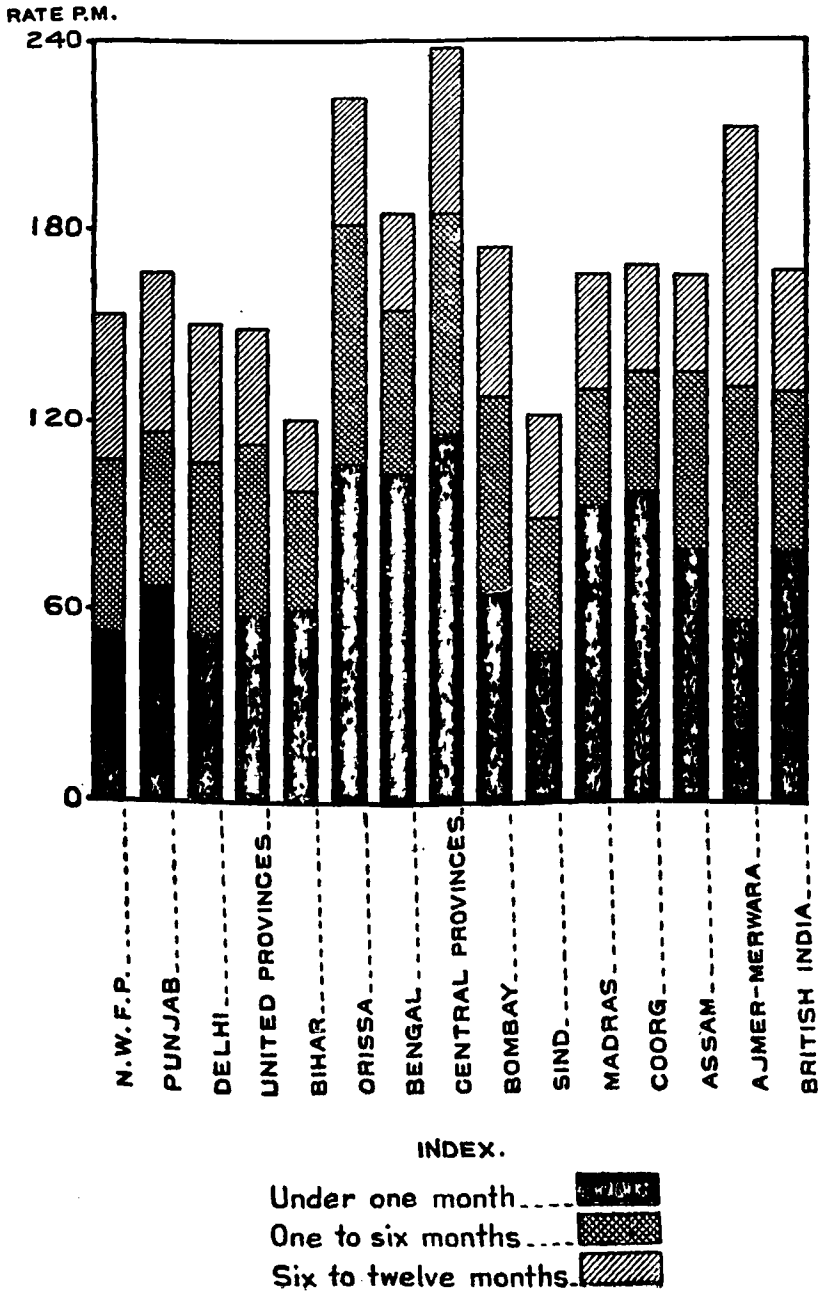


TABLE I (*xi*).

	Deaths under one week.	Rate *per mille* live births.	Percentage of: Deaths under one month.	Percentage of: Total infant deaths.
England & Wales		21·1	74·6*	40·1
British India	**444,200**	**47·3**	**60·4**	**28·3**
N.-W. F. P.	1,944	27·0	50·9	17·5
Punjab	43,245	37·1	55·1	22·2
Delhi	1,016	29·8	57·5	19·9
U. P.	64,885	36·4	63·5	24·5
Bihar	45,715	41·0	69·8	34·2
Orissa	14,186	59·4	56·5	26·8
Bengal	89,202	58·6	57·7	31·8
C. P.	41,383	53·8	54.6	26·3
Bombay	27,430	36·2	55·9	20·8
Sind	1,898	24·1	53·8	20·2
Madras	101,825	59·6	65·4	35·9
Coorg	213	56·3	58·7	33·4
Assam	10,596	44·7	57·1	27·1
Ajmer-Merwara	662	32·1	58·2	15·2

Infantile mortality rates for the two sexes based on the corresponding male and female births, are presented in Table I (*xii*). For British India the male rate is 175·8 *per mille* and the female rate 157·6. In all provinces, except Sind and Ajmer-Merwara, the male rate is higher than the female rate.

TABLE I (*xii*).

	Infant deaths. Males.	Infant deaths. Females.	Rates *per mille* of corresponding live births. Males.	Rates *per mille* of corresponding live births. Females.
British India	**858,619**	**711,577**	**175·8**	**157·6**
N.-W. F. P.	6,366	4,724	154·3	153·8
Punjab	106,691	87,817	173·4	159·5
Delhi	2,751	2,359	155·7	143·2
U. P.	147,566	117,123	156·1	140·1
Bihar	74,073	59,715	129·7	109·6
Orissa	28,155	24,833	230·2	213·2
Bengal	152,159	128,764	193·0	175·7
C. P.	85,732	71,902	251·8	223·7
Bombay	71,532	60,568	183·6	164·2
Sind	5,191	4,184	119·5	123·7
Madras	154,697	129,233	177·1	154·6
Coorg	341	296	172·1	164·1
Assam	21,074	17,983	172·2	156·6
Ajmer-Merwara	2,291	2,076	206·0	217·9

The infant mortality rate is correctly regarded as an index of the status to which communal health has attained. Adverse environmental conditions, such as malnutrition and insanitary surroundings, more quickly sap the vitality of those who have recently emerged from the relatively stable environment of uterine life than of older children who have undergone their apprenticeship in the more varied and exacting life of the outer world. Further, apart from

* Deaths under four weeks.

good food and sanitary surroundings, infantile life demands sound mother-craft. A community can achieve conspicuous success in infant welfare work only through the education of its mothers. A high level of attainment in this branch of public health endeavour indicates a quickening of the civic conscience to the needs of the most helpless section of the community, as well as to the recognition of the potential value of the infants as the future citizens of the country. In India infant mortality remains high, as compared with many other countries. However, even here, the rate has fallen from 195 in 1920 to 167 in 1938. Further, it has been shown in limited areas, where intensive work has been undertaken, that a considerable saving of infant life can be achieved in spite of the adverse home conditions among the poor people. Two instances may be quoted. In Calcutta, the Calcutta Maternity and Child Welfare Committee has four Red Cross Clinics and five other affiliated clinics under its charge and, in these institutions, a total of 2,093 infants came under care during 1938. The infant mortality rate for the areas attached to the clinics was 73·6 *per mille* in 1938 while the corresponding rate in Calcutta was 235. In Madras 14,589 babies came under the care of the welfare scheme of the Corporation and among them, the infantile mortality rate was 113·3 *per mille* as against a rate of 222·1 for the city as a whole. These infant welfare campaigns include the provision of milk as a supplement to the diet, wherever necessary, and systematic home visits for the education of the mothers. Even so, the adverse effects of overcrowded and insanitary home conditions and of inadequate response to educative efforts from the mothers owing to their lack of general education must have remained to counteract, to some extent, the beneficent work of the welfare staffs. These reductions in infantile mortality constitute therefore a gratifying record of success and they point to the possibility of similar achievement elsewhere, wherever properly organised infant welfare work can be brought into being.

In last year's report comment was made on the lack of information regarding the true causes of infantile mortality and the suggestion was made that child welfare centres under the charge of women doctors appeared to afford the best opportunities for collecting reliable figures for the different parts of the country. In the following table figures are quoted for the causes of death amongst the infants attending the Red Cross centres under the Calcutta Maternity and Child Welfare Committee, the centre attached to the All-India Institute of Hygiene and Public Health, Calcutta, and the centre of the Lady Reading Health School, Delhi. The total figures number only 288, but they give some indication of the more important causes associated with infantile mortality. It cannot be too strongly emphasised that one of the most important functions of child welfare organisations is the collection of correct vital statistics, which are so essential for throwing light on the problems of morbidity and mortality at that period of life. Inadequacy of women doctors will, for a long time, continue to impede the progress of such investigations on any extensive scale. However, it is desirable that all existing facilities should be mobilised towards this end. Welfare organisations under the direct charge of women doctors, with health visitors to assist them, can alone undertake the task satisfactorily. Health visitors, through their contact with the homes of the people, should be able to give valuable help in this direction but, without guidance from medical women trained in public health work, no conspicuous success can be attained. Child welfare work is at present largely confined to urban areas, while the necessity for information regarding rural areas is equally urgent. Health Units working in different provinces have women medical officers and health visitors on their staff and these units appear therefore to be suitable for the collection of this information.

TABLE I (*xiii*).

Causes of death.	Calcutta Red Cross Centres		All-India Institute of Hygiene Centre	Lady Reading Health School Centre,
	Under one month.	One to twelve months.	Under twelve months.	Under 12 months.
Trauma	2	..	..	..
Convulsions	2	1	..	..
Tetanus	11	..	..	..
Umbilical sepsis	1	..	1	3
Respiratory diseases	11	43	19(Pneumonia)	16
Gastro-intestinal diseases	6	31	14	25
Fevers	3	6	..	10
Smallpox	..	5	3	..
Congenital Syphilis	4	1 Syphilitic cirrhosis of the liver.	1	2
Prematurity	6	..	1	3
Congenital debility	3	..	..	..
Neglect	5	..	5	..
Marasmus	..	7	..	..
Dysentery	..	6	..	..
Cholera	..	1	..	..
Anaemia	..	1	..	2
Sepsis	..	1	..	..
Measles	..	..	2	..
Tuberculosis	..	..	2	..
Diphtheria	..	..	1	..
Jaundice	..	..	..	2
Unknown	7	..	6	6
Total	61	103	55	69

The figures for the Calcutta Red Cross clinics are given separately for neonatal mortality and for deaths between the first and twelfth months. For the other two institutions only combined figures are given. The figures for all the three centres emphasise the fact that most of these deaths were preventable. Eleven deaths due to tetanus and five due to umbilical sepsis are all the more to be deplored because they give definite evidence of the neglect of elementary aseptic precautions. Taking the three institutions together, respiratory and gastro-intestinal diseases accounted for 57 per cent of the total infant deaths. These diseases are mainly dependent on environmental factors for their production and it is significant that, when the mortality figures for the first month of life and for the succeeding eleven months are considered separately, the contributions of respiratory and intestinal diseases to the total mortality are 28 and 65 per cent respectively. On the other hand causes like prematurity and congenital debility take their toll before the first month of life is finished.

Mortality among Children.

6. Table I (*xiv*) sets out the mortality figures for children under 10 years of age. Corresponding percentages for England and Wales are also given for comparison.

TABLE I (*xiv*).

	Under one year.	% of total deaths.	1—5 years.	% of total deaths.	5—10 years.	% of total deaths.	Total under 10 years.	% of total deaths.
England and Wales	...	6·	...	2·1	...	1·1	...	10·0
British India	1,570,196	23·5	1,301,531	19·4	371,980	5·6	3,243,707	48·5
N.-W. F. P.	11,090	20·5	10,834	20·1	3,489	6·5	25,413	47·1
Punjab	194,508	31 2	131,131	21·1	30,818	4·9	356,457	57·2
Delhi	5,110	30 5	3,602	21·6	670	4·0	9,382	56·1
U. P.	264,689	21·2	291,776	23·3	61,106	4·9	617,571	49.4
Bihar	133,788	17·5	162,668	21·3	48,969	6·4	345,425	45·2
Orissa	52,988	25·4	35,228	16·9	9,980	4·8	98,196	47 1
Bengal	280,923	21·3	212,155	16·2	97,116	7·4	590,194	44·9
C. P.	157,634	25·1	129,200	20·5	34,905	5·5	321,739	51·2
Bombay	132,100	24·1	130,823	23·9	25,765	4·7	288,688	52 7
Sind	9,375	19·5	7,937	16·5	2,880	6·0	20,192	42·0
Madras	283,930	27.5	154,286	14·9	43,130	4·2	481,346	46·6
Coorg	637	16·0	464	11·6	167	4·2	1,268	31 8
Assam	39,057	22·0	27,651	15·5	12,431	7·0	79,139	44·5
Ajmer-Merwara	4,367	29·2	3,776	25·3	554	3·7	8,697	58·2

There can be no clearer indication of the huge waste of child life that takes place in India than that presented in the above table. While in England deaths a1 ong children under 10 years of age form only 10 per cent of the deaths at all ages, in India the proportion is nearly 49 per cent and of them about half occur among infants under one year. They point to the conclusion that child welfare work is perhaps the most pressing health problem in India today.

Information regarding the causes of mortality among children under five years of age is available with regard to those attending the three welfare centres mentioned already in connection with infantile mortality. The figures are shown below :—

TABLE I (*xv*).

Causes of death.	Red Cross Centres, Calcutta.	Centre attached to the All-India Institute of Hygiene and Public Health, Calcutta.	Centre attached to the Lady Reading Health School, Delhi.
Respiratory diseases	5	7 (one a case of tuberculosis).	15
Gastro-intestinal diseases	12	..	5
Typhoid	5	2	..
Fevers (not defined)	2	..	6
Cholera	6	2	..
Dysentery	1	4 (diarrhoea and dysentery)	..
Meningitis	1	..	..
Smallpox	3	7	2
Septic conditions	1	2	..
Enlarged liver	1	1	..
Marasmus	1	..	..
Anaemia	1	1	..
Measles	..	3	4
Accident	..	1	..
Jaundice	..	..	2
Unknown	..	1	5
Total	39	31	39

The figures are few. Their value mainly lies in the fact that the cause of death has been ascertained by a more efficient agency than that which exists for the greater part of the country. Respiratory and gastro-intestinal diseases are responsible for 44 deaths or for 40 per cent of the total deaths numbering 109. There were 12 deaths due to smallpox. No information is available as to the vaccinal condition of these children but, in view of the fact that they were all under five years of age, it is certain that vaccination, if efficiently carried out, should have given them protection.

Still births.

7. The figures for still births in British India and the different provinces are given below :—

TABLE I (*xvi*).

	Male.	Female.	Total.	Rate *per mille* live births.	Male still births per 100 female still births.
British India	**111,456**	**89,092**	**200,548**	**21·3**	**125**
N.-W. F. P.	127	71	198	2·8	179
Punjab	5,186	3,411	8,597	7·4	152
Delhi	277	234	511	15·0	118
U. P.	7,426	5,674	13,100	7·4	131
Bihar	16,582	13,183	29,765	26·7	126
Orissa	6,174	5,230	11,404	47·8	118
Bengal	39,663	32,662	72,325	47·5	121
C. P.	9,229	7,251	16,480	24·9	127
Bombay	6,982	5,597	12,579	16·6	125
Sind	617	454	1,071	13·9	136
Madras	13,888	11,209	25,097	14·7	124
Coorg	25	32	57	15·1	78
Assam	5,202	4,031	9,233	38·9	129
Ajmer-Merwara	58	73	131	6·3	79

The still birth rates for the provinces show wide variation, from 2·8 *per mille* in N.-W. F. P. to 47·8 *per mille* in Orissa. Even in the Western countries with their well-developed services for the registration of vital statistics, still birth registration is far from complete. As was pointed out last year, the information collected at the child welfare centre attached to the Hygiene Institute, Calcutta, in respect of 1,615 pregnancies gave a still birth rate of 51·7 *per mille* of live births and the low figures given in the above table are undoubtedly due to defective registration. The last column gives the ratio of the two sexes in respect of still birth. No explanation can be offered for the high ratios recorded for most provinces.

Registration and Compilation of Vital Statistics.

8. This subject was extensively discussed in the reports for 1936 and 1937. A brief reference to it is, however, being made here only to draw attention to a few glaring cases of defective registration selected from different

provincial public health reports and to emphasise the fact that continual vigilance on the part of the health authorities in the country can alone make for a progressive improvement of the situation.

TABLE I (*xvii*).

Province.	Name of town.	Population.	Birth rate *per mille*.	Death rate *per mille*.
N.-W. F. P.	Abbottabad	11,573	24·5	7·7
U. P.	Behat	4,238	1·4	1·3
	Mainpuri	15,342	7·7	6·1
	Juhi	20,092	9·6	2·1
	Basti	22,526	9·5	8·9
Bihar	Dinapur	12,347	6·9	3·7
	Katihar	9,014	9·8	3·8
	Sahibganj	8,530	7·4	2·6
	Deoghar	8,117	2·4	3·7
	Dumka	5,317	6·6	3·1
	Madhupur	4,997	7·6	4·8
	Giridih	11,122	7·1	3·7
	Jamshedpur	51,137	7·0	5·9
Orissa	Cuttack	36,357	13·3	10·8
Bengal	Suri	10,908	9·3	10·2
	Bansberia	14,211	8·9	14·1
	Jaynagar Majilpur	9,755	5·7	8·0
	Khulna	19,120	7·8	14·4
	Gauripur	6,319	2·4	3·2
	Comilla	31,365	7·5	7·7
C. P.	Jubbulpore Cantonment	20,065	6·3	7·3
Bombay	Urban	9,762	10·0	8·4

Some efforts are being made to detect and bring on record unregistered births and deaths but the work of detection is not being pursued with sufficient vigour in many parts of the country. As may be seen from the figures given below, in respect of both rural and urban areas, Madras Presidency has contributed by far the largest share of detections of births and of deaths. Similar evidence was also produced in the 1936 and 1937 reports. It is therefore clear that the matter demands serious attention from other provincial health authorities also.

Unregistered births and deaths detected during 1938.

Figures for all provinces.

	Urban areas.		Rural areas.	
	Births.	Deaths.	Births.	Deaths
With health officers	17,711	9,888	65,755	19,816
Without health officers	10,171	4,309	12,239	3,222

The percentage contributions made by Madras Presidency to the above figures for British India were :—

	Urban areas.		Rural areas.	
	Births.	Deaths.	Births.	Deaths.
With health officers	59	74	59	58
Without health officers	83	75	..*	..*

Rainfall.†

9. Taking the year as a whole, the rainfall over the country was 24 per cent or more in excess in the East United Provinces, Berar, the Bombay

* In this province all the rural areas have been provided with health officers.

† Prepared from a memorandum on rainfall and other weather conditions by the Director General of Observatories, India.

Deccan and North Hyderabad, and 21 per cent or more in defect in the Punjab, Sind and Rajputana. Over the rest of the country, it was within 20 per cent of the normal.

The cold weather period, January-February, was characterised by excessive rainfall in Hyderabad and East and South Madras. Rainfall was also abundant in most parts of Northern India and parts of Central India and the Central Provinces mainly in association with western disturbances. In Gujarat and the surrounding divisions and in the Madras Deccan, rainfall was much less than usual. Averaged over the plains of India, the rainfall of the season was in excess by 9 per cent.

The rainfall during the hot weather period, March to May, was deficient over the region from Baluchistan and the North-West Frontier Province to the West United Provinces and East Central India, and abundant over most of the remaining divisions. Over the plains of the country as a whole, there was an excess of 10 per cent.

The southwest monsoon period, June to September, was marked by spells of heavy rains which resulted in floods in the Brahmaputra valley in July and in the United Provinces in August. The total rainfall of the period was above the average in the East United Provinces, Bihar, the Central Provinces, the Deccan, Mysore and East Madras. There was, however, less rain than usual in Northwest India, particularly in and near the triangle-Delhi, Lahore and Ajmer. Averaged over the plains of India, the season's rainfall was in excess by 6 per cent.

During the retreating southwest monsoon period, October to December, the season's rainfall was generally scanty except over the region from Gujarat and the Konkan to East Central India and the East Central Provinces and in Orissa and Assam. Averaged over the plains of India, the rainfall was in defect by 19 per cent during the period.

Table I (*xviii*) gives the figures for actual rainfall in inches as compared with the normals in the various provinces in each of the four periods mentioned above.

TABLE I (*xviii*).

	January to February.		March to May.		June to September.		October to December.		Total.	
	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.
Mean of India*	1·2	1·1	4·3	3·9	33·9	32·1	3·5	4·3	42·9	41·4
N.-W. F. P.	2·4	2·5	3·1	4·2	7·0	8·0	0·7	1·2	13·2	15·9
Punjab	2·5	1·9	0·6	2·0	10·9	15·3	0·3	0·8	14·3	20·0
U. P.	1·9	1·5	0·8	1·4	37·6	33·5	1·0	1·8	41·3	38·2
Bihar	1·6	1·4	4·1	3·4	46·1	41·9	1·4	3·0	53·2	49·7
Orissa	1·1	1·5	6·5	5·7	38·8	43·6	7·9	6·8	54·3	57·6
Bengal	1·4	1·3	18·6	12·6	57·6	54·9	5·1	6·0	82·7	74·8
C. P.	1·1	1·3	1·7	1·7	48·1	40·5	4·5	2·8	55·4	46·3
Bombay	0·0	0·2	2·5	1·5	41·8	39·3	5·5	3·4	49·8	44·4
Sind	0·1	0·3	0·1	0·5	3·2	5·2	0·1	0·3	3·5	6·3
Madras	2·4	1·2	6·7	6·0	31·0	28·5	8·1	16·2	48·2	51·9
Assam	1·7	2·2	23·6	25·1	70·3	66·1	8·5	6·9	104·1	100·3
Rajputana	0·2	0·6	0·2	0·9	15·5	19·1	0·3	0·8	16·2	21·4
Central India	0·8	0·8	0·9	0·9	35·1	33·1	2·4	1·6	39·2	36·4
Hyderabad	1·0	0·5	2·5	2·0	34·7	25·9	2·3	3·7	40·5	32·1
Mysore	0·2	0·3	4·0	5·3	25·6	22·4	1·7	8·2	31·5	36·2

*Excluding Burma.

Agricultural Conditions.

10. Table I (*xix*) gives the cultivated and uncultivated acreage in British India and different provinces during the years 1937-38 and 1938-39.

TABLE I (*xix*).

		Cultivated.		Uncultivated.	
		Net area actually sown.	Current fallows.	Culturable waste other than fallows.	Not available for cultivation.
British India	1938-39	209,377,838	48,325,002	94,180,437	91,807,971
	1937-38	213,512,956	45,684,723	91,968,759	92,224,730
N.-W. F. P.	1938-39	2,070,207	607,739	2,866,660	2,679,231
	1937-38	2,109,029	576,056	2,851,700	2,687,052
Punjab	1938-39	25,151,597	5,790,871	14,275,353*	12,983,323
	1937-38	27,317,578	3,695,782	14,164,936	13,021,910
Delhi	1938-39	172,314	50,829	62,604	82,709
	1937-38	213,444	11,161	65,305	78,502
U. P.	1938-39	36,081,950	2,795,085	9,964,452	9,928,409
	1937-38	36,171,073	2,637,755	9,988,955	9,887,964
Bihar	1938-39	17,978,400	6,791,000	6,800,775	6,148,185
	1937-38	19,323,400	6,970,527	5,123,622	6,294,248
Orissa	1938-39	6,507,729	1,646,240	3,138,765*	6,211,434
	1937-38	6,447,555	1,736,964	3,571,049	6,211,433
Bengal	1938-39	24,730,100	5,015,347	6,638,732*	9,300,924
	1937-38	24,728,100	4,926,500	5,753,822	9,433,039
C. P. & Berar	1938-39	24,369,333	3,950,319	14,017,848*	4,881,011
	1937-38	24,537,804	3,805,214	13,992,370	4,899,410
Bombay	1938-39	28,779,649	4,994,829	913,021*	5,712,230
	1937-38	28,715,213	5,059,224	888,388	5,722,961
Sind	1938-39	5,108,271	5,005,638	5,505,834	13,798,854
	1937-38	5,140,479	4,873,248	5,899,512	13,548,576
Madras	1938-39	31,383,337	9,860,540	10,862,821	14,497,180
	1937-38	32,031,679	9,451,438	10,537,675	14,603,510
Coorg	1938-39	144,696	164,667	11,690	359,474
	1937-38	144,673	164,667	11,690	359,474
Assam	1938-39	6,618,912	1,412,955	18,774,650	4,577,400
	1937-38	6,295,796	1,601,597	18,856,570	4,577,400
Ajmer-Merwara.	1938-39	281,343	238,943	347,232	647,607
	1937-38	337,133	174,590	263,165	899,251

*Culturable area included.

NOTE—The figures are subject to revision.

Table I (*xx*) gives the areas in acres under food crops in British India and the provinces during 1938-39 :—

TABLE I (*xx*).

	Area under food grains.	Area under other food crops.	Total area under food crops.
	Acres.	Acres.	Acres.
British India.	186,273,641	9,914,820	196,188,461
N.-W. F. P.	2,026,086	139,303	2,165,389
Punjab	19,200,843	890,320	20,091,163
Delhi	133,546	8,036	141,582
U. P.	38,802,762	2,558,786	41,361,548
Bihar	19,654,900	1,452,500	21,107,400
Orissa	6,185,672	250,128	6,435,800
Bengal	23,985,200	1,587,800	25,573,000
C. P. and Berar . . .	20,396,324	310,796	20,707,120
Bombay	20,278,881	511,447	20,790,328
Sind	4,239,051	62,938	4,301,989
Madras	25,435,445	1,603,683	27,039,128
Coorg	101,307	19,673	120,980
Assam	5,610,638	499,746*	6,110,384
Ajmer-Merwara . . .	222,986	19,664	242,650

NOTE—The figures are provisional.

A comparison of the figures given in Tables I (*xix*) and I (*xx*) with similar figures for the previous year shows that, for British India as a whole, there has been a fall both in the net area actually sown, taking all forms of cultivation into consideration, and the total area under food crops. As regards the net area sown, all provinces except Orissa, Bengal, Bombay and Coorg have shared in the decrease. With respect to the cultivation of food crops, the United Provinces, Orissa, the Central Provinces, Bombay, Madras, Coorg and Assam recorded small increases during 1938-39 as against the previous year.

For detailed information regarding agricultural conditions the provincial season and crop report should be consulted.

Famine Relief.

11. During 1938-39, famine conditions prevailed in the following areas :—

Punjab.—Special and general remissions of land revenue, water rates and taccavi loans to the extent of about Rs. 53 lakhs were given to alleviate the economic distress caused by drought, famine and hailstorms in several districts of the province, including Hissar, Rohtak, Gurgaon and Karnal. In the latter part of the year Hissar was declared a famine district.

*Excludes acreage under miscellaneous food crops, as it is not separately available.

Concession rates for the carriage of fodder into Hissar and certain other districts were also granted, resulting in a further expenditure of Rs. 2·3 lakhs.

United Provinces.—The kharif crop was damaged by floods in some places and by insufficient rains in others. Relief was given in the form of remission of land revenue to the extent of Rs. 10·54 lakhs and the grant of taccavi loans amounted to Rs. 33 lakhs.

Bengal.—The early onset of the monsoon in 1938 caused floods in fifteen districts of the province, including Murshidabad, Faridpur, Pabna, Jessore, Khulna, Dacca, Rajshahi, Rangpur and Malda. Considerable damage to standing crops and destruction of property took place in the affected areas. The total population that suffered distress numbered about eight millions. The measures taken to relieve distress included the grant of gratuitous relief to the extent of Rs. 3·8 lakhs. About Rs. 4 lakhs were spent on test works.

Madras.—Rainfall was scanty and untimely in Bellary, Anantapur and Kurnool districts. There was failure of crops as well as scarcity of fodder. Test works and relief works had to be opened to relieve the general unemployment. Arrangements were also made to supply fodder from Government depots. Free grazing was allowed in Panchayat forests. East Godavari, West Godavari and Kistna districts suffered damage from a cyclone in November 1938. The provincial Government supplied building materials and gave money grants to the poor for reconstructing the houses destroyed by the cyclone.

Assam.—Floods in the Assam Valley and the Surma Valley seriously damaged the crops in many districts. In addition to suspension and remission of land revenue and grant of taccavi loans, Rs. 1·6 lakhs were spent on gratuitous relief.

Ajmer-Merwara.—Most crops on dry kharif area were affected by the failure of rains and general scarcity of fodder prevailed. A large number of cattle migrated to better pastures in the neighbouring States. Concession rates for the carriage of fodder were introduced to relieve the situation. Ordinary forest coupes were thrown open to grazing. Relief works were also opened wherever distress was felt.

Indian States.

12. The vital statistics for a number of Indian States are given below in Table I (*xxi*). Even a cursory examination of these figures shows that in several States registration of births and deaths is markedly defective. Birth and death rates in the neighbourhood of 15 and figures well below this number occur in a number of instances and they definitely point to defective registration.

Arrangements have recently been made for the supply of weekly and monthly vital statistics from Indian States to the office of the Public Health Commissioner, in order that their incorporation in the returns issued from his office may give the statistics an all-India character. When this system has worked for a year it will be possible to include in the annual report of the Public Health Commissioner a brief review of health conditions in the States as revealed by the vital statistics supplied from them. In the meantime no comment is being offered on the table given below, which has at least the advantage of presenting in convenient form the available information in respect of a large number of States.

TABLE I (*xxi*).

State.	Estimated population on 30th June 1938.	Births.	Birth rate *per mille.*	Deaths.	Death rate *per mille.*	Deaths under one year.	Infantile mortality per 1,000 births.
Jammu and Kashmir	3,885,112	99,796	25·7	82,777	21·3	13,841	138·7
PUNJAB STATES.							
Patiala	1,717,759	72,472	42·2	39,183	22·8	8,056	111·2
Nabha	305,350	8,177	26·8	5,350	17·5	253	30·9
Kapurthala	340,576	10,350	30·4	4,767	14·0	994	96·0
Bahawalpur	1,133,787	23,720	20·9	11,832	10·4	*	*
Jind	336,769	15,897	47·2	8,865	26·3	2,311	145·4
Sirmoor	154,523	2,787	18·0	2,626	17·0	454	162·9
Faridkot	174,411	8,827	50·6	4,838	27·7	1,383	156·7
Malerkotla	85,089	2,515	29·6	1,017	12·0	196	77·9
Chamba	150,537	1,919	12·7	1,822	12·1	8	4·2
Kalsia	61,667	2,645	42·9	1,510	24·5	384	145·2
Pataudi	19,445	988	50·8	464	23·9	155	156·9
Dujana	29,961	1,162	38·8	765	25·5	227	195·4
Nalagarh	52,325	842	16·1	558	10·7	118	140·1
Mandi	223,906	7,553	33·7	5,335	23·8	1,101	145·8
Suket	61,400	1,507	24·5	1,274	20·7	*	*
Bilaspur	103,187	3,719	36·0	2,979	28·9	603	162·1
U. P. STATES.							
Tehri (Garhwal)	581,304	11,385	19·6	8,146	14 0	2,070	181·8
Benares	412,014	11,317	27·5	6,148	14·9	1,474	130·2
Rampur	473,213	9,169	19·4	7,601	16·1	*	*
MADRAS STATES.							
Travancore	5,895,242	117,145	19·9	53,243	9·0	9,174	78·3
Cochin	1,370,705	19,395	14·1	11,830	8·6	1,323	68·2
Pudukottah	381,539	6,799	17·8	5,712	15·0	666	98·0
Banganapalle	41,138	1,263	30·7	694	16·9	70	55·4
Sandur	14,991	531	35·4	302	20·1	83	156·3
RAJPUTANA STATES.							
Jaipur	2,846,620	24,074	8·5	16,686	5·9	3,601	149·6
Alwar	785,391	28,215	35·9	15,599	19·9	*	*
Kishangarh	91,618	2,223	24·3	1,311	14·3	455	204·7
Tonk	338,964	6,408	18·9	6,080	17·9	395	61·6
Shahpura	58,706	1,608	27·4	1,058	18·0	306	190·3
Lawa	3,179	46	14·5	52	16·4	*	*
Jaisalmaire	82,562	757	9·2	687	8·3	*	*
Banswara	250,582	1,733	6·9	2,750	11·0	16	9·2
Partabgarh	83,454	1,902	22·8	2,005	24·0	106	55·7
Dungarpur	256,342	645	2·5	2,880	11·2	133	206·2
Kushalgarh	40,257	115	2·9	239	5·9	27	234·8
Bharatpur	480,002	15,510	32·3	9,155	19·1	1,717	110·7
Dholpur	273,173	4,468	16·4	2,605	9·5	*	*
Karauli	145,512	2,145	14·7	1,643	11·3	126	58·7
Kotah	726,680	26,654	36·7	21,422	29·5	5,216	195·7
Bundi	238,465	4,730	19·8	2,273	9·5	513	108·5
Jhalawar	116,477	950	8·2	949	8·1	176	185·3
BARODA AND GUJARAT STATES							
Balasinor	58,758	2,125	36·2	1,422	24·2	456	214·6
Bansda	55,172	1,020	18·5	805	14·6	156	152·9
Baria	175,665	1,729	9·8	1,604	9·1	*	*
Baroda	2,675,100	95,254	35·6	62,924	23·5	13,828	145·2
Cambay	99,531	3,464	34·8	2,569	25·8	678	195·7
Chhota Udepur	158,529	3,861	24·4	1,909	12·0	364	94·3
Dharampur	124,395	3,026	24·3	1,862	15·0	*	*
Jawhar	62,834	2,302	36·6	1,739	27·7	92	40·0
Lunawada	103,984	1,424	13·7	1,661	16·0	240	168·5
Rajpipla	233,702	7,810	33·4	5,873	25·1	1,242	159·0
Sachin	23,669	822	34·7	533	22·5	96	116·8
Sant	92,742	1,805	19·5	1,206	13·0	141	78·1

*Figures not available

TABLE I (*xxi*)—*contd.*

State.	Estimated population on 30th June 1938.	Births.	Birth rate *per mille.*	Deaths.	Death rate *per mille.*	Deaths under one year.	Infantile mortality per 1,000 births.
BARODA AND GUJARAT STATES—*contd.*							
Agar	3,586	157	43·8	108	30·1	47	299·4
Bhadeswa	12,133	350	28·8	267	22·0	26	74·3
Chhaliar	3,148	35	11·1	28	8·9	15	428·6
Gad Boriad	13,998	249	17·8	238	17·0	39	156·6
Jambughoda	12,742	415	32·6	252	19·8	45	108·4
Kadana	19,166	461	24 1	315	16·4	46	99·8
Mandwa	6,606	141	21·3	126	19·1	36	255·3
Palasni	3,117	98	31·4	52	16·7	12	122·4
Sihora	5,016	126	25·1	95	18·9	18	142·9
Sanor	2,045	90	44·0	48	23·5	18	200·0
Surgana	15,487	304	19·6	194	12 5	35	115·1
Uchad	3,707	102	27·5	78	21·0	22	215·7
Umeta	7,208	229	31·8	181	25·1	29	126·6
Vajiria	5,739	173	30·1	175	30·5	48	277·5
Pandu Mewas	22,813	522	22·9	402	17·6	74	141·8
EASTERN STATES AGENCY.							
Athgarh	55,868	1,573	28·2	1,499	26·8	413	262·6
Athmallik	67,587	3,011	44·5	2,120	31·4	75	24·9
Bamra	163,022	6,481	39·8	4,753	29·2	1,668	257·4
Baramba	52,599	1,995	37·9	1,427	27·1	490	245·6
Baudh	143,197	4,877	34·1	3,586	25·0	776	159·1
Bonai	88,993	3,297	37·0	2,536	28·5	795	241·1
Daspalla	49,921	1,863	37·3	1,624	32·5	501	268·9
Dhenkanal	321,462	9,667	30·1	7,155	22·3	2,644	273·5
Gangpur	391,434	14,346	36·6	9,322	23·8	2,436	169·8
Hindol	56,435	1,918	34·0	1,289	22·8	585	305·0
Keonjhar	520,090	18,796	36·1	14,257	27·4	3,255	173·2
Khandpara	87,932	3,429	39·0	2,743	31·2	878	256·1
Kharswan	47,343	1,222	25·8	799	16·9	135	110·5
Narsinghpur	46,657	1,864	40·0	1,938	41·5	377	202·3
Nayagarh	156,750	5,781	36·9	5,040	32·2	2,053	355·1
Nilgiri	71,065	1,871	26·3	1,938	27·3	406	217·0
Pal-Lahara	31,047	1,345	43·3	879	28·3	290	215·6
Rairakhol	39,003	1,299	33·3	1,109	28·4	385	296·4
Rampur	52,423	1,465	27·9	1,222	23·3	324	221·2
Seraikela	164,300	3,121	19·0	2,234	13·6	409	131·0
Sonepur	246,111	7,194	29·2	4,036	16·4	1,664	231·3
Tigiria	28,701	837	29·2	710	24·7	221	264·0
Cooch Behar	590,002	12,803	21·7	11,553	19·6	1,629	127·2
Bastar	569,146	16,140	28·4	12,091	21·2	2,747	170·2
Changbhakar	24,422	477	19·5	415	17·0	8	16·8
Chhuikhadan	35,738	1,191	33·3	893	25·0	337	283·0
Jashpur	222,694	8,011	36·0	4,307	19·3	*	*
Kalahandi	585,447	22,770	38·9	18,715	32·0	3,699	162·5
Kanker	144,326	5,442	37·7	2,785	19·3	662	121·6
Kawardha	80,916	3,030	37·4	2,258	27·9	508	167·7
Khairagarh	181,886	6,021	33·1	3,977	21·9	830	137·9
Korea	99,445	2,421	24·3	1,839	18·5	530	218·9
Nandgaon	206,455	7,711	37·3	5,596	27·1	2,230	289·2
Patna	619,904	25,083	40·5	15,089	24·3	4,842	193·0
Raigarh	303,925	8,898	29·3	6,007	19·8	1,328	149·2
Sakti	53,553	1,958	36·5	1,168	21·8	427	218·6

* Figures not available.

TABLE I (*xxi*)—*concld.*

State.	Estimated population on 30th June 1938.	Births.	Birth rate per *mille*.	Deaths.	Death rate *per mille*.	Deaths under one year.	Infantile mortality per 1,000 births.
EASTERN STATES AGENCY—*contd.*							
Sarangarh	137,175	3,959	28·9	2,779	20·3	728	183·9
Surguja	555,547	11,405	20·5	7,755	14·0	*	
Udaipur	117,252	3,737	31·9	2,347	20·0	658	176·1
Mayurbhanj	988,896	30,163	30·5	21,998	22·2	4,121	136·6
Talchar	83,408	546	6·5	366	4·4	80	146·5
KOLHAPUR AND DECCAN STATES.							
Akalkot	100,936	3,755	37·2	2,531	25·1	223	59·4
Bhor	149,708	5,882	39·3	4,232	28·3	1,164	197·9
Jamkhandi	123,881	4,464	36·0	2,695	21·8	627	140·5
Kurundwad (Senior)	48,193	2,028	42·1	1,140	23·7	279	137·6
Kurundwad (Junior)	43,470	1,819	41·8	1,291	29·7	290	159·4
Miraj (Senior)	102,289	2,633	25·7	3,039	29·7	395	150·0
Miraj (Junior)	45,130	1,592	35·3	1,124	24·9	238	149·5
Phaltan	64,862	2,517	38·8	1,898	29·3	431	171·2
Ramdrug	36,559	1,636	44·7	1,159	31·7	222	135·7
Savanur	22,879	935	40·9	508	22·2	90	96·3
Kolhapur	999,313	36,755	36·8	24,352	24·4	*	*
Mudhol	64,805	2,252	34·8	1,244	19·2	228	101·2
Sangli	285,683	11,454	40·1	7,298	25·5	1,798	157·0
Sawantwadi	248,299	7,809	31·4	4,790	19·3	698	89·4
Aundh	85,270	3,570	41·9	2,165	25·4	659	184·6
CENTRAL INDIA AGENCY.							
Indore	1,440,997	36,033	25·0	36,619	25·4	9,952	276·2
Bhopal	757,462	22,724	30·0	29,202	38·6	6,043	265·9
Narsingarh	123,003	1,738	14·1	1,376	11·2	386	222·1
Rajgarh	149,690	2,244	15·0	1,693	11·3	*	*
Kurwai	23,711	379	16·0	394	16·6	112	295·5
Makrai	17,514	617	35·2	848	48·4	160	259·3
Khilchipur	49,646	699	14·1	643	13·0	160	228·9
Mohammadgarh	2,665	52	19·5	58	21·8	16	307·7
Ratlam	123,330	2,089	16·9	1,966	15·9	384	183·8
Dewas Senior Branch	7,956	1,197	150·5	1,171	147·2	*	*
Piploda	9,524	189	19·8	223	23·4	65	343·9
Panth Piploda	4,648	114	24·5	86	18·5	20	175·4
Jobat	21,516	237	11·0	189	8·8	*	*
Sailana	41,307	504	12·2	619	15·0	66	131·0
Barwani	156,481	2,295	14·7	2,358	15·1	*	*
Nimkhera	6,975	89	12·8	138	19·8	*	*
Bakhatgarh	8,767	217	24·8	304	34·7	*	*
Ratanmal	2,469	52	21·1	63	25·5	16	307·7
Bharudpura	3,223	34	10·5	18	5·6	3	88·2
Kathiwara	6,756	140	20·7	101	14·9	29	207·1
Mathwar	3,044	150	49·3	76	25·0	23	153·3
Hyderabad	15,876,698	170,432	10·7	158,971	10·0	*	*
Mysore	6,981,469	150,410	21·5	102,228	14·6	16,082	106·9

* Figures not available.

SECTION II.

HISTORY OF THE CHIEF DISEASES.

Introduction.

13. The methods of registration and compilation of vital statistics in British India have been fully discussed in the annual reports for 1936 and 1937. It has been shown that, under existing conditions, it is possible to record the causes of death, apart from such epidemic diseases as cholera, smallpox and plague, only in certain broad groups such as " fevers ", " respiratory diseases " and " all other causes ". Bearing this in mind the two diagrams facing this page may be examined. One diagram gives the mean number of deaths during the ten years, 1929—38, classified under these causes of mortality and the other presents similar information in respect of 1938. The undifferentiated groups entitled " fevers " and " respiratory diseases " are by far the most important from the point of view of the health of the community and, as has been repeatedly stressed by the Public Health Commissioner in his previous annual reports, progress in preventive work on scientific lines depends largely on patient investigation by the health authorities in order to separate out the diseases that constitute these groups.

Cholera.

14. The geographical distribution of cholera in Asia during 1930—38 is shown in the map facing this page. The areas affected by cholera in the different countries during 1937 and 1938 are shown separately and, in respect of previous years, the localities affected have the respective dates shown against them. It will be seen that, in 1938, cholera was prevalent in certain parts of Japan, Korea, China, Indo-China, Burma, India and Afghanistan. Of these countries India had the highest incidence. All excepting Korea and Afghanistan had cholera outbreaks in 1937 also. Malaya too had the infection during this year.

A striking feature is the general absence of infection during the whole period, 1930—38, in the Netherlands Indies. The insular position of these territories and the strict measures taken by the health authorities are responsible for successfully keeping out cholera. A comparison between the cholera situation in British India and in the Netherlands Indies was made in a monograph* entitled " The Eradication of Cholera and the Campaign against Smallpox in Netherlands Indies " from which the following is an extract :—

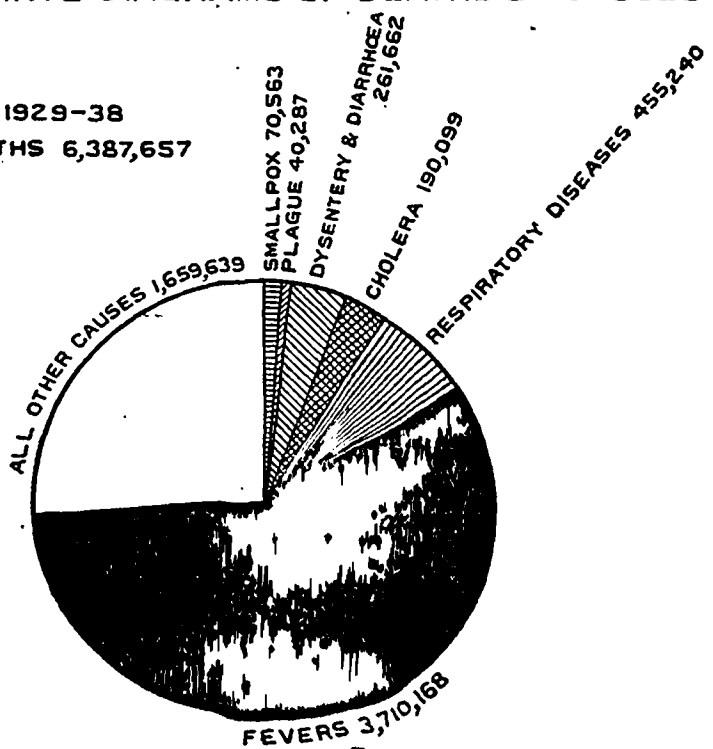
" The population of British India in 1921 was 318,942,000 and of Java and Madoera 34,984,171 in 1920. We find from the table by summation that during the years 1923—34, the number of deaths from cholera in British India was 2,490,409 and for Java and Madoera only 17, of which 16 were in the year 1927 and one in 1928. It seems evident that the great improvement in the Netherlands Indies, as regards cholera, must be set down to the introduction of pipe water-supplies, reorganization of the public health service, large scale vaccination, insistence on certificates of vaccination for immigrants and pilgrims, and strict quarantine regulations."

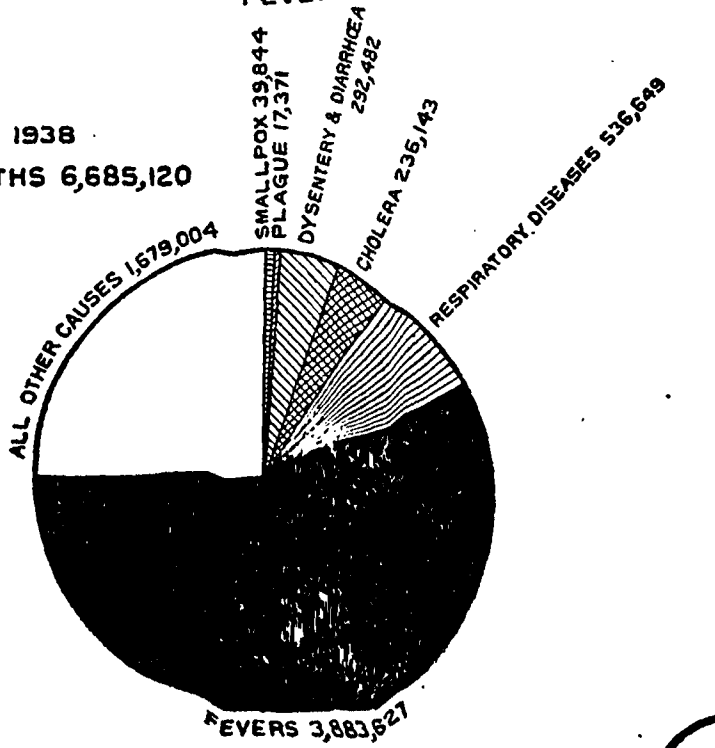
It is clear that India has to make considerable progress before attaining such conspicuous success in the campaign against cholera.

In table II (*i*) are presented the average annual numbers of deaths for each of the quinquennia between 1877 and 1936 as well as the deaths during the individual years of the present decennium.

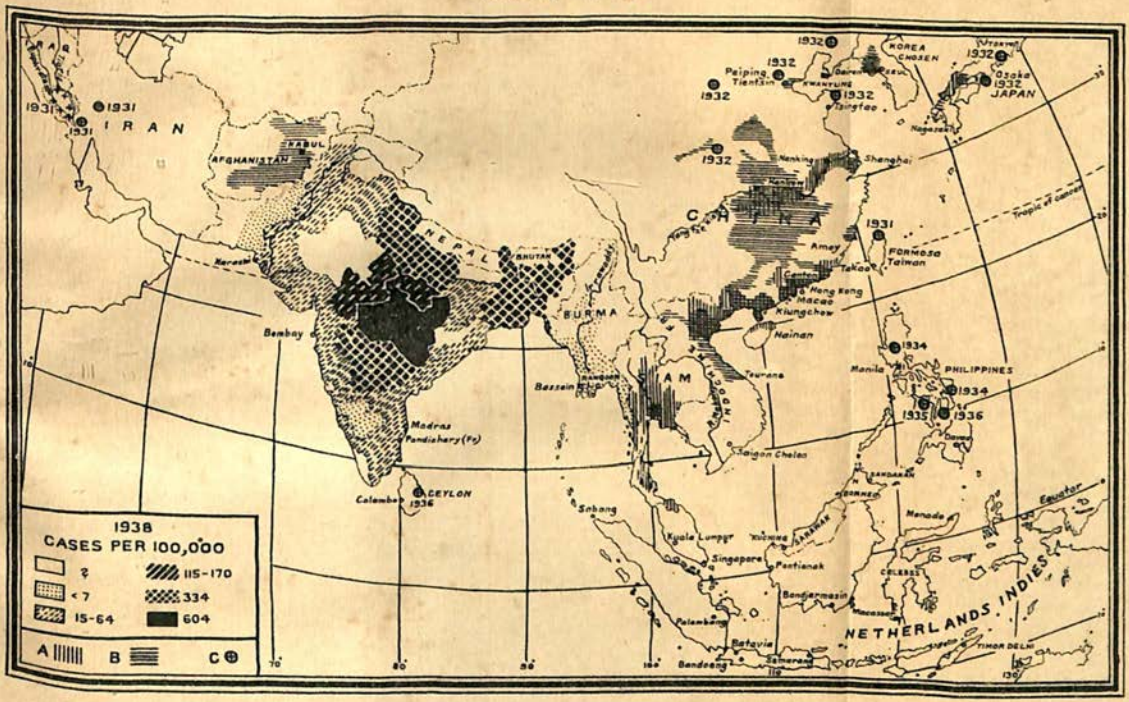
* Page 859, Tropical Diseases Bulletin, November 1936.

BRITISH INDIA
COMPARATIVE DIAGRAMS OF DEATHS BY CAUSES





GEOGRAPHICAL DISTRIBUTION OF CHOLERA IN ASIA 1930-1938



A. Disease reported in 1937.

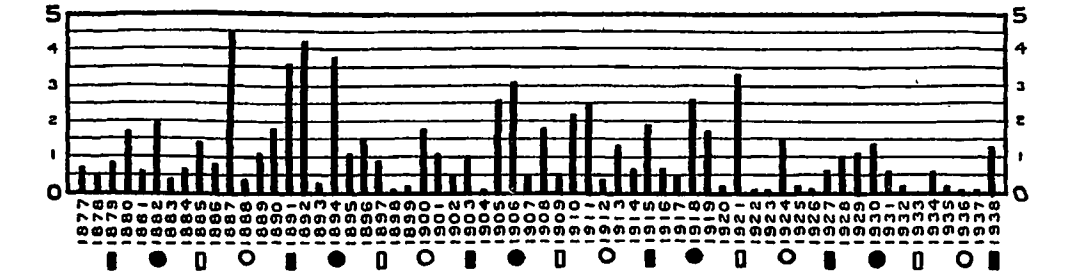
B. Disease reported in 1938.

C. The dates shown on the map for the various territories correspond to those of the latest occurrence of the disease.

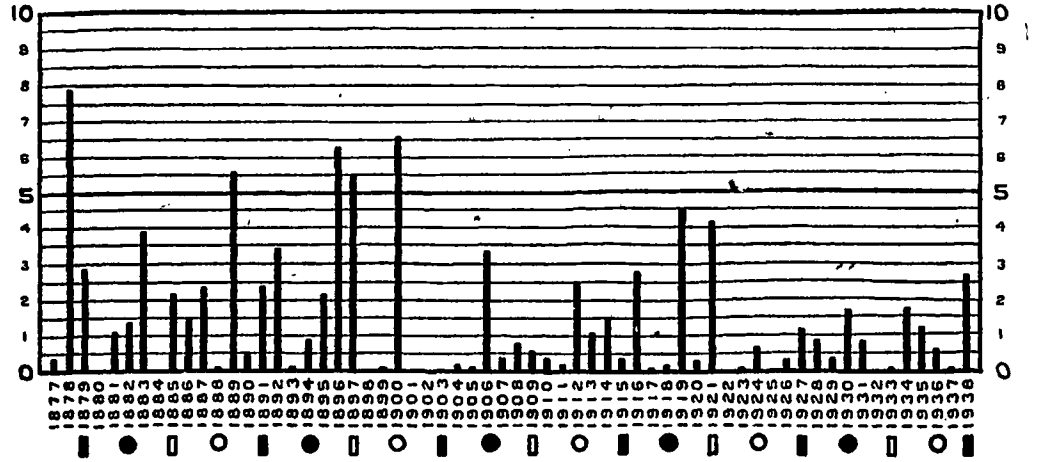
NOTE:- Reproduced from the League of Nation's Weekly Epidemiological Record for August 31st, 1939. R.H. 705.

DIAGRAMS SHOWING THE RATES OF CHOLERA MORTALITY PER MILLE OF THE POPULATION DURING THE PERIOD 1877–1938. THE YEARS DURING WHICH THE FESTIVALS AT ALLAHABAD & HARDWAR TOOK PLACE ARE ALSO INDICATED.

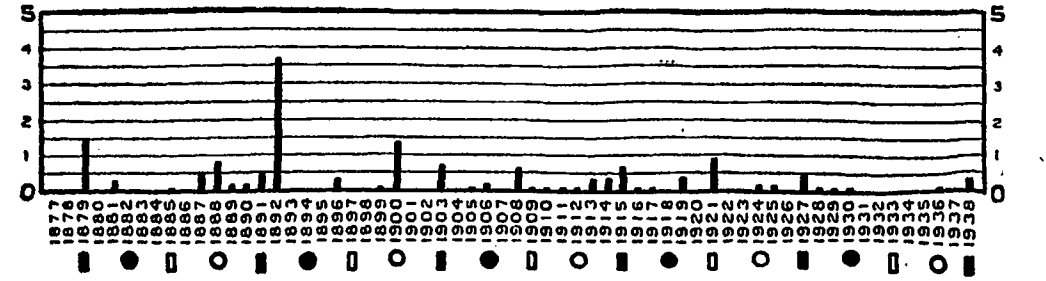
UNITED PROVINCES



CENTRAL PROVINCES



PUNJAB & DELHI



INDEX.

Kumbh festivals in Hardwar ■

Adh-Kumbh festivals in Hardwar □

Kumbh festivals in Allahabad ●

Adh-Kumbh festivals in Allahabad ○

Cholera Mortality in British India (excluding Burma) Table II (i).

TABLE II (*i*).

Period.	Annual average.
1877—81	288,949
1882—86	286,105
1887—91	400,934
1892—96	443,890
1897—01	383,294
1902—06	367,160
1907—11	397,127
1912—16	328,593
1917—21	392,070
1922—26	143,890
1927—31	297,756
1932—36	140,440
1931	220,375
1932	66,137
1933	68,139
1934	198,886
1935	210,304
1936	158,736
1937	99,054
1938	236,143

It will be seen that the annual quinquennial average mortality from this disease has ranged from nearly 444,000 during 1892—96 to about 140,000 during 1932—36. During the present decennium also the variation in the figures for individual years has been considerable. The year 1938 has recorded the largest number of cholera deaths since 1931, the increase over that of 1937 being 137,000. The cause of this rise was a widespread dissemination of cholera infection all over Northern India as the result of an outbreak of the disease which took place at the Hardwar festival in April 1938. The part played by festival centres in the dissemination of cholera has been recognised by the health authorities of this country and, of all the festivals, the *Ardh* and full *Kumbh melas* at Allahabad and Hardwar have been known to be the most dangerous from this point of view. In the diagram facing this page are shown graphs representing cholera mortality during a period of 62 years in relation to the occurrence of the *melas* at Hardwar and Allahabad. It will be seen that the festival years have generally been associated with extensive outbreaks of the disease.

Apart from the general impression of a possible association between a rise in cholera incidence and the occurrence of these festivals which the graphs suggest, it was considered desirable to investigate whether the relationship, if any, between the two factors can be demonstrated by a statistical examination of the available figures. As may be expected, the festivals at Hardwar and Allahabad have been shown to be responsible for an increased incidence of cholera in the United Provinces. On the other hand, the festivals at Hardwar alone have been shown to have influenced the rise of cholera in the Punjab and Delhi, while no association could be demonstrated between a rise in cholera mortality in the Central Provinces and the occurrence of these festivals either at Allahabad or Hardwar.

Turning to the history of the cholera epidemic in 1938, the Hardwar festival started on 1st February and lasted till the end of April. Although the festival lasted several weeks, it was only on important days that large gatherings of pilgrims assembled and such occasions are particularly dangerous from

the point of view of spread of infectious disease. Important days for the festival were the 28th February, 31st March and 13th April, the total attendance on the last date being stated to have been about a million.

The N.-W. F. Province, the Punjab and Delhi were completely free from cholera during the first quarter of the year. Delhi province recorded its first case of the disease (a pilgrim returning from Hardwar) in the week ending 2nd April and the Punjab during the succeeding week. It may be recalled that the 31st March was an important day attracting a large gathering of pilgrims. Thereafter the infection spread rapidly. The rate of its spread towards the north-west may be seen from the fact that, while in the Punjab the first case took place in Ambala Cantonment during the week ending 9th April, by the end of the following week eleven districts had become infected, that of Lahore forming the western limit. During the week ending 23rd April the infection spread to 16 other districts, so that 27 out of the 29 were infected by the end of that week. In the following week ending 30th April, the disease spread to the N.-W. F. Province. Cholera spread also to Bihar and the Central Provinces, the outbreak in the latter being severe. The United Provinces also suffered heavily. Provincial details regarding outbreaks of cholera will be found later in the paragraphs dealing with individual provinces.

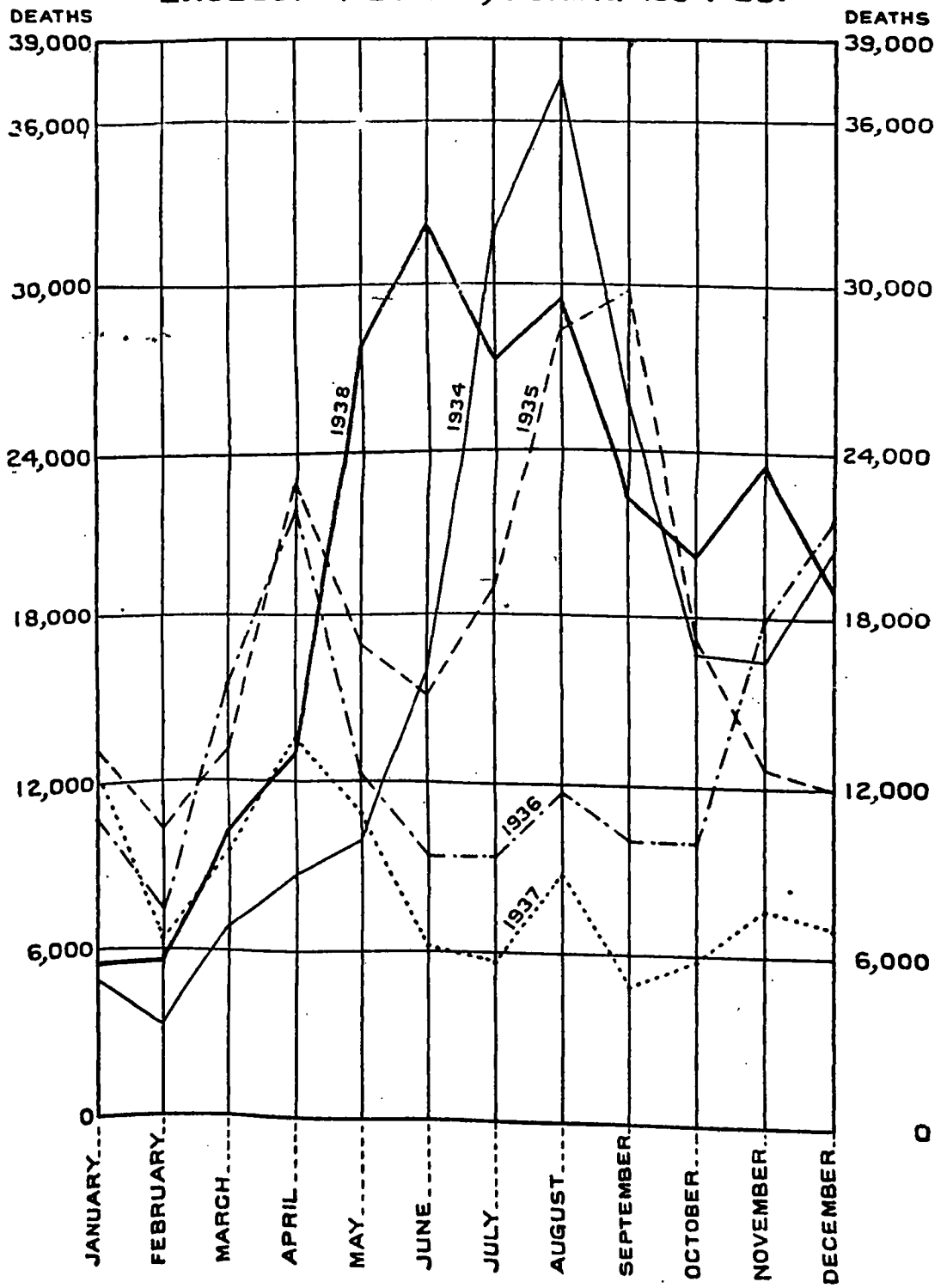
Provincial Governments were called upon to shoulder the burden of additional expenditure as the result of the spread of cholera and the following table presents the information regarding such expenditure:—

TABLE II (*ii*).

Province.	Cost of additional staff.	Cost of cholera vaccine, other medicines and medical requisites.	Total.
	Rs.	Rs.	Rs.
1. N.-W. F. Province	15,625		15,625
2. Punjab	1,20,000		1,20,000
3. Delhi Province (Delhi city only)	2,432	3,232	5,664
4. United Provinces	81,071	1,14,082	1 95,153
5. Bihar	3,500	800	4,300
6. Bengal	5,860	1,261	7,121
7. Central Provinces	28,985	33,900	62,885
GRAND TOTAL	..	..	4,10,748

It will be seen that a sum of over four lakhs of rupees was spent by the different provinces for controlling the epidemic. Apart from this large avoidable expenditure, the disease caused an amount of suffering and mortality which cannot be assessed in terms of money. It is clear that prompt measures are necessary in order to prevent these recurring outbreaks of cholera originating in festival centres. The provision of protected water-supplies and of satisfactory methods of nightsoil disposal in the rural and urban areas of the country can alone eventually solve the cholera problem. At the same time, before

CHOLERA DEATHS BY MONTHS IN BRITISH INDIA, EXCLUDING BURMA, DURING 1934-38.



DISTRIBUTION OF CHOLERA MORTALITY DURING 1938

INDEX.

6·5 to 11·7	per mille
3·0 to 6·5	" "
1·0 to 3·0	" "
0·1 to 1·0	" "
Below 0·1	" "
Areas reporting no mortality	
Reports not received	
Major Ports (total deaths)	⊙,O

such a stage can be reached, every effort must be made to reduce the incidence of the disease by the adoption of other means that are available.

Such a measure, although its value is strictly temporary, is mass inoculation against cholera by which protection can be conferred on a community threatened with a possible outbreak of the disease. While the sanitary control of the festival area is a necessary measure of protection, the large tracts of territory, which may possibly be infected, through which the pilgrims have to travel to and from the festival centre, constitute danger zones against which, under existing conditions, adequate protection can be afforded only through inoculation. In view of the importance of the problem, the Central Advisory Board of Health decided that a special Committee should be appointed to investigate the possibility of introducing a system of compulsory inoculation of pilgrims attending festival centres. Although in a report dealing with 1938, it may be an anticipation of future events when a reference is made to occurrences taking place in 1939 and 1940, it may not be out of place to record here that this Committee, after careful deliberation, made certain concrete proposals for adoption by provincial and State Governments in order to introduce an indirect form of compulsory inoculation of pilgrims at selected festival centres. The Central Advisory Board of Health, at its meeting in July 1940, commended these proposals to the earnest consideration of the Governments concerned.

In the North-West Frontier Province the deaths from cholera in 1938 numbered 740 against 24 during the previous year. Infection from Hardwar was first imported to Dera Ismail Khan, Kohat, Hangu and Mardan at the end of April and during the early part of May. Later in the month, the disease spread to Peshawar and Bannu. By the end of June the danger from the epidemic was over in the province. The health staff was augmented, prompt preventive measures were taken and anti-cholera inoculation was carried out on an extensive scale. It is stated that the willingness of the Pathan to be inoculated made it possible to put an effective check on the spread of the disease. In all, over 234,000 inoculations were carried out.

In the Punjab cholera deaths in 1938 numbered 5,760 while the corresponding average annual figure for the previous ten years was only 941. During these ten years the maximum mortality from cholera in any single year (1929) was 2,309, so that the incidence of the disease in 1938 was about two and a half times the highest figure recorded during the previous ten years. The height of the epidemic in 1938 was reached in the third week of May when 696 deaths were recorded. The outbreak then gradually declined, the last case reported being on 16th September 1938.

A total of 1,584 different centres was affected, of which 129 were towns and 1,455 villages. Although the *Kumbh mela* is a Hindu festival and infection was brought into the Punjab by returning pilgrims, only 55 per cent of the total number of cases took place among the Hindus, the remaining 45 per cent being distributed among the other communities. A large additional staff was employed and, among other preventive measures, anti-cholera inoculation was carried out on 666,652 individuals.

Delhi province reported 182 deaths from cholera in 1938 while, during the previous year, the disease was altogether absent. Prompt measures were taken in the villages and in the urban areas. In the rural area it is stated that the use of a motor van equipped with the necessary material for the treatment of patients and for preventive work and with a doctor in charge, who knew the people, was of great value in the campaign against the disease. In

addition the rural health staff also took part in the carrying out of the preventive measures. A question of considerable importance was that of preventing the possibility of widespread dissemination of infection through milk in the urban areas, which depend largely on the villages for this important article of food. It is stated that the Police and Revenue Departments rendered valuable assistance to the health authorities in this campaign and that the vigilance of all concerned was responsible for the prevention of such a calamity.

In Delhi city, where congestion and overcrowding render spread of infection easy, additional doctors were employed and anti-cholera inoculation was carried out on an extensive scale, in all about 70,000 persons being protected. It is stated that this prompt measure was largely responsible for restricting the incidence of cholera to 139 cases. In the province as a whole 93,213 inoculations were carried out.

As may be expected the United Provinces bore the brunt of the cholera epidemic which started at Hardwar. Deaths from this disease numbered 70,622 in 1938 against 6,341 during the previous year. The epidemic reached its peak incidence in June with 21,013 deaths in that month alone. In the rural areas, of the 48 districts the mortality rate from cholera in 14 was above the provincial average rate (1·5), Banda district recording the highest figure (7·8). Other districts with high incidence of the disease in the rural areas were Hamirpur (5·1), Sultanpur (4·6), Gonda (4·6) and Partabgarh (4·5). Low cholera death rates were registered in the districts of Benares (0·19), Muttra, Budaun and Ghazipur (0·11 each), Etah (0·03) and Mainpuri (0·02).

Of the 440 towns in the province, 196 escaped infection while another group of 144 towns experienced only very mild outbreaks causing not more than ten deaths in each case. The highest cholera mortality rate was recorded in the town of Naraini in Banda district (23·2). Other towns with high rates were Ramnagar in Bara Banki district (14·6), Atarra in Banda district (14·0) and Rikhikesh in Dehra Dun district (12·8). Vigorous anti-cholera measures were adopted in all the infected areas. In the rural areas of some districts control of cholera was rendered difficult owing to scarcity of water and arrangements were made through the district authorities and various non-official organisations for the removal of silt from wells and for the provision of drinking water. In addition all the usual preventive measures against cholera were carried out, a large temporary staff being recruited for assisting the permanent health organisation in the prosecution of the campaign. Anti-cholera inoculation was carried out as extensively as possible in the affected urban and rural areas and in all, 1,528,700 inoculations were carried out. Grants totalling Rs. 40,300 were placed at the disposal of district magistrates by Government for preventive measures in rural areas. Temporary regulations under the Epidemic Diseases Act were enforced in a number of rural districts and municipalities.

In Bihar cholera deaths in 1938 totalled 14,750, an increase of 801 deaths over the figure for the previous year. The disease is reported to have startedin sporadic form in all the districts except Ranchi and Singhbhum, its maximum incidence having been reached in the month of November. The Director of Public Health reports that, in spite of the general absence of protected water-supplies and efficient conservancy arrangements, the experience of recent years has shown that the employment of trained health personnel under qualified health officers has produced an improvement in the situation by preventing, in many cases, outbreaks of the disease from taking an explosive turn and spreading widely in the community. Ten districts in the province employ health officers with suitable subordinate staff. To combat the epidemic in 1938 it is reported

that temporary doctors on epidemic duty were employed in all districts. The Director states that anti-cholera inoculation has now become a popular preventive measure and that 593,375 doses of the vaccine were issued during 1938 for mass inoculation in the affected areas.

There was an abnormal increase of cholera in Bengal in 1938 in comparison with the previous year, the numbers of recorded deaths from this disease being 71,133 and 32,710 respectively in the two years. This rise does not appear to have been associated with the Hardwar festival. The reason is stated to be the occurrence of extensive floods in October 1938, the spread of the disease being very high in the succeeding month of November. The curve of cholera incidence in Bengal generally reaches its lowest level during the monsoon period, rises gradually in autumn and through the winter months and reaches its maximum in April and May. In 1938, however, the maximum was reached in November, about a month after the flood had swept over wide areas of the province. In the flood months there occurred in the affected areas 14,763 deaths from cholera as against 1,022 during the same period of the previous year. Compared with 1937, of a total of 26 districts, 17 are stated to have experienced an increased incidence of the disease in 1938.

The usual preventive measures were carried out. In order to facilitate work in the areas affected by the flood, it is reported that " floating dispensaries " were employed, each consisting of a doctor, a compounder and a medicine carrier with the necessary drugs and appliances. A total of 3,401,615 c. cs. of anti-cholera vaccine was issued for use in the areas of infection during 1938.

The Central Provinces were hit hard by outbreaks of cholera during 1938, the total mortality from this disease reaching 45,332 as against 1,107 in 1937. Cholera first appeared in January1938 in Hoshangabad and Bilaspur districts, the infection being imported from outside. The epidemic continued during the succeeding months of February and March. The outbreak of the disease following the Hardwar festival introduced infection to numerous parts of the province and cholera continued to prevail widely till December, when all the districts became free. The total number of anti-cholera inoculations performed was 1,887,632.

In Bombay Presidency the incidence of cholera in 1938 was very much less than in the previous year, the numbers of deaths from this disease being 3,813 and 10,992 respectively in the two years. During the year under review cholera epidemics prevailed in 111 registration circles and 812 villages. For the period 1934—37 the average yearly mortality from the disease was in the neighbourhood of 11,000 and the figure for 1938 was therefore a welcome drop from the high incidences recorded in the previous years.

In 1938 the largest numbers of deaths were recorded in the districts of West and East Khandesh. Other districts experienced varying degrees of prevalence of the disease, Ahmedabad alone being completely free. The first half of the year was relatively free from infection, only 268 deaths being recorded during this period out of a total of 3,813 deaths from cholera for the whole year. The disease reached its highest incidence in the period, August to October.

The usual precautionary measures were carried out in the urban and rural areas. The total number of inoculations carried out was 323,579.

Cholera infection was introduced into Sind in 1938 by pilgrims returning from the Hardwar festival. The first case was reported on 21st April and the last case took place on 28th August. During the intervening period, a total of 343 deaths from cholera was recorded.

Cholera is endemic in certain deltaic areas like that of the Ganges and the Brahmaputra in Bengal and that of the Cauvery in Madras Presidency. In

North-Western India generally the disease is prevalent only in epidemic form, certain years showing little or no incidence of cholera while in others a high mortality from this cause is recorded. For instance, an examination of the cholera deaths in Sind for a period of 22 years from 1917 to 1938 shows that in 1920 and 1930 no deaths took place from this cause while in eight other years, the number of deaths was under 10 each year. On the other hand, in 1929, cholera deaths increased to 6,411. This wide disparity in the incidence of the disease between individual years is, generally speaking, characteristic of the N.-W. F. Province, the Punjab, Sind and Baluchistan, relatively dry areas where the climatic conditions are presumably unfavourable for the continued presence of the disease.

In 1938, 31 cholera deaths were reported from urban areas and 312 from rural areas in Sind. The preventive campaign carried out included the appointment of ten special officers, medical inspection by the railway authorities of passengers at Ruk, Sukkur and Mirpurkhas stations, the provision of facilities to local bodies for the free examination of water-supplies and anti-cholera inoculations totaling 27,434.

In Madras Presidency there has been a steady decrease in the prevalence of cholera since 1935. The numbers of deaths recorded under this cause in the years between 1935 and 1938 were 35,456, 34,117, 23,307 and 10,252. The drop in the figure for 1938 from that for the previous year is particularly noticeable.

From the point of the epidemiology of cholera the different parts of the province present a varied experience. Thus the southern Tamil districts, which receive the bulk of their rainfall from the north-east monsoon, have their cholera season coinciding with the late autumn and winter months, while the West Coast and Northern Circars, which get the benefit of the south-west monsoon, have their cholera season earlier during the second and third quarters of the year. In between these lies a group of central districts and they appear to partake of the characteristics of both the other groups in regard to cholera incidence. In the light of these remarks the cholera history of 1938 may be briefly summarised.

The winter epidemic of 1937 continued in the first quarter of 1938 in a severe form in the districts of South Arcot and Tanjore and to a milder extent in a group of central districts, Chingleput, Cuddapah, Chittoor, Coimbatore, Nellore and Trichinopoly. The epidemic subsided in all the districts except Tanjore where it continued in a mild form throughout the year.

In the second quarter a widespread epidemic started in the East and West Godavari districts of the Northern Circars and spread northwards to Vizagapatam and to the south and west into the Ceded Districts as far as Cuddapah and Kurnool. The height of the epidemic was reached in the third quarter and the infection subsided in the last quarter.

The Director of Public Health states that, in many instances, the spread of cholera has been traced to the migration of labour in connection with the transplantation and picking of the groundnut crop. The question has been investigated in eight districts and it is stated that a programme of preventive work has been formulated for application during the next cholera season. Another important investigation was that of the carrier problem in Madura under the direction of the Director, King Institute, the Municipal Public Health Laboratory carrying out the work. It is reported that the work is not complete and that further progress is expected during the next cholera season. The Director of Public Health states that the passing of the Public Health Act in 1939, the inauguration of a scheme for rural protected water-supplies and

the training in public health of the medical practitioners belonging to the Subsidised Rural Medical Service have contributed to strengthen the organisation for the effective control of cholera in the villages.

The number of deaths from cholera in Assam during 1938 was 11,907 against 5,440 in 1937. The districts of Sylhet and Goalpara suffered most during the year under review, the death rates from this disease being 2·9 and 2·3 *per mille* respectively. Sibsagar and Lakhimpur recorded the lowest rate, namely, 0·02. Cholera deaths were registered in 100 registration circles among a total of 148 and in 2,629 villages out of a total of 28,333 villages in the province. The epidemic reached its maximum intensity in the months of November and December while February recorded the lowest incidence.

Preventive work was carried out by seven mobile units, each consisting of three subassistant surgeons and six men to carry disinfectants, drugs and other articles. It is reported that this staff is insufficient to deal with an extensive epidemic and that the provision of additional units is essential for rendering aid to the people. The total number of persons inoculated during the year was 972,696.

The cholera researches carried in the different laboratories in India are briefly summarised below :—

Central Research Institute, Kasauli.—Investigations were carried out for developing an improved technique for the differential isolation of *V. cholerœ*. Many different methods were tried during the year and it was found that considerable success could be obtained by a modification of the liquid enrichment medium of Wilson and Blair. The modification consisted in the substitution of peptone water for broth, and mannose for mannite, and a mixture of salts at 2 per cent concentration in character and proportions similar to those existing in sea water. The improved technique was subjected to field trials in Calcutta in April and May. Seventysix specimens from 37 clinical cases of cholera, which had been declared negative by the ordinary methods in use, were re-examined and 28·9 per cent proved positive by the new method and 15·3 per cent by peptone water enrichment. The medium, however, will not differentiate agglutinable vibrios and mannose fermenting inagglutinable vibrios. A high degree of suppression of all coliform types is reported to be an important result of the use of this medium. The method was under trial in Bengal and O agglutinable vibrios from tanks in rural areas were isolated in many cases. The difficulty due to the presence of mannose fermenters of types other than *V. cholerœ* in water still remains and the question is being investigated. Chemical studies were in progress with a view to obtaining a substance which would be specifically fermentable by the agglutinable vibrio.

All-India Institute of Hygiene and Public Health, Calcutta.—In order to test the efficiency of the modified differential medium of Wilson and Blair for the isolation of agglutinable Inaba O vibrios investigations were carried out on samples of stools from cholera and non-cholera patients, contacts of cholera cases and healthy persons with no contact and on samples of water collected from tanks, wells, rivers and drains in Calcutta and certain villages in Bengal. Peptone water was used as a control. In the case of both media it was found that the isolation of Inaba O positive organisms was more frequent in typical cases, although there was quite a number of failures even in clinically typical cases. Some of the clinically atypical cases also yielded positive results. The differential medium, though not wholly efficient, was found to be better than peptone water medium.

Studies were also carried out into the bacteriological aspects of the problem of epidemicity and endemicity of the disease. Four areas exhibiting combinations of high and low epidemicity and endemicity were selected on the basis of previous statistical studies. The investigations carried out included (*i*) chemical analysis of water-supplies, (*ii*) serological examination of samples of blood obtained from healthy non-contacts and (*iii*) continued examination of stools of cases and contacts and of water samples. It is reported that the findings of these investigations suggested that infection with Inaba O vibrios by itself might not necessarily cause disease. Apart from the immunity status of the population, the change in virulence or in the quantum of infection might be responsible for the occurrence of epidemics.

The statistical studies were confined to the nineteen homogeneous cholera districts into which the whole of south-west Bengal had been divided. The relationship of certain meteorological factors, namely, temperature, rainfall, relative humidity and number of rainy days, to the incidence of cholera was investigated in respect of five districts by the

method of analysis of covariance. Only for one district was positive correlation shown to exist and that in respect of temperature alone.

The trend of cholera incidence was found to be on the decline in the case of 10 out of 19 districts. A classification of these districts was carried out on the basis of endemicity as well as epidemicity. Foster's " Grating periodograph " was used to investigate the periodicity of the incidence of the disease and in no homogeneous cholera district was this periodicity demonstrated.

The method of forecasting cholera, which had been reported previously, was applied to the homogeneous districts and satisfactory results were obtained in the case of ten districts.

School of Tropical Medicine, Calcutta.—One thousand three hundred and seven samples of faeces were examined from 631 clinical cases of cholera, O agglutinable vibrios were isolated from 58 per cent of the cases, H agglutinable and not agglutinable vibrios from 7 per cent while no vibrios could be isolated from 35 per cent of the cases. It was clear that improved methods of isolation for *V. cholerœ* were required.

Sera from 113 cholera patients were examined for the presence of agglutinins. In the majority of patients agglutinins were demonstrated between the seventh and tenth day of the disease, the H agglutinins appearing earlier and in higher dilutions for the homologous and the standard Inaba strains.

Of 15 patients, in whom repeated stool examinations were negative, cholera agglutinins were demonstrated in five persons, samples being collected after the fifth day of the disease. On the other hand, in 13 contacts of cholera patients (workers in the cholera wards) no cholera agglutinins could be demonstrated (1 in 10 dilution) as well as in 110 healthy persons who gave no history of cholera.

Fourteen samples of cholera vaccine were tested for sterility, freedom from abnormal toxicity, antigenic response in rabbits and man and protective value in guinea pigs.

Pasteur Institute, Shillong.—An inquiry was started in Goalpara district in Assam to estimate in a rural population the incidence of vibrios in man and his environment before during and after an epidemic of cholera. Examination of stools from cholera cases, convalescent contacts and healthy persons and water samples was carried out in an epidemic area as well as in a cholera-free area. The alkaline peptone water enrichment method was employed for the cultivation of the vibrio and not the modified Wilson and Blair method. From these investigations the conclusion was drawn that inagglutinable vibrios are natural inhabitants of waters and that such vibrios taken in with water have little chance of survival in the gut of healthy persons, but that in those suffering from an intestinal disturbance they are more often met with in their stools.

During a 10-day period of investigation of an outbreak of cholera in Manipur State stools of 19 cases were examined culturally and the agglutinable vibrio could not be isolated from any of these cases. Samples of blood from these patients taken on an average about the 16th day after the onset of symptoms gave, with a single exception, uniformly negative results. This case agglutinated Inaba smooth suspension up to a dilution of 2,500, a titre very high even for a cholera case. It is not known whether the haemolysis which the serum had undergone was responsible for any non-specific agglutination. It was stated that the negative cultural and serological findings in a number of cases at the commencement of a cholera epidemic appeared to suggest that the vibrio could at times be infective in a less easily cultivable form. Observations were also made on the effect of bacteriophage on the agglutinable vibrio.

King Institute, Guindy.—Previous work had divided Madras Presidency into two zones corresponding to the greater prevalence of the Inaba or Ogawa type of vibrio. Broadly speaking, the strains of *V. cholerœ* isolated previously from the Northern Circars and the Ceded Districts, where there were outbreaks of the usual severity, were of the Inaba type and from the southern districts of the province the vibrios were of the Ogawa type. However, during 1938, the few strains of vibrios derived from sporadic cases or small outbreaks in the southern districts of South Arcot, Tanjore and Ramnad were found to be of the Inaba type. Further investigation is required to determine whether this change of type in the Ogawa zone during a period of low prevalence of the disease is accidental or is really significant.

Investigations on the rôle of the common house fly in the spread of cholera continued, laboratory bred flies being used. The length of period during which the vibrio remains alive in the body of the house fly was investigated. Five hundred and twentytwo flies were dissected at intervals ranging from two hours to nine days after feeding with a mixture of sterile milk and a suspension of a young cholera culture. In 22 cases cholera vibrios could be isolated up to eight hours after feeding and in one instance up to 24 hours. Similarly isolation of vibrios from the faecal and vomit spots could not be effected beyond 24 hours.

DISTRIBUTION OF PLAGUE MORTALITY DURING 1938

INDEX.

1·0 to 1·9 per mille

0·1 to 1·0 „ „

Below 0·1 „ „

Areas reporting no mortality

Reports not received

Major Ports (total deaths) 0,0

Mention was made in last year's report of a bactericidal principle in the abdomen of flies which might be responsible for the early disappearance of flies. It was shown that flies caught in nature possessed the same bactericidal substance in their body. Although it was not possible to isolate this substance in a completely pure state, it was separated in a partially pure form. It was shown that it was of a crystalloid nature and that its bacteri cidal power was not due to an enzyme because it could resist heating to 115°C. for 20 minutes. Further this substance does not appear to have the same bactericidal effect on other organisms, such as *B. typhosus*, B. *paratyphosus* A and B. *B. dysenteriae*, Flexner and Shiga, *B. coli* and *Staphylococci*.

Plague.

15. The incidence of plague in India has been steadily decreasing during recent years. In 1938 the number of deaths from this cause recorded in British India was 17,371, a fall of 10,798 deaths in comparison with that registered during 1937. The N.-W. F. Province, Delhi, Orissa, Bengal, Assam, Sind, Coorg and Ajmer-Merwara completely escaped infection during 1938 while the Punjab registered only one death from plague. Of the total mortality from this disease in British India, 77·3 per cent took place in the United Provinces, 10·6 per cent in Bihar and 6·6 per cent in Madras Presidency. The other provinces which reported plague deaths were Bombay Presidency and the Central Provinces.

The monthly distribution of plague mortality in India for 1938 is shown in table F of Appendix II. The month of highest incidence was March, while all the first four months of the year recorded large figures.

The history of plague epidemics in the provinces may now be briefly reviewed.

In the United Provinces there was a fall in plague mortality from 24,036 in 1937 to 13,436 in 1938. Twentyeight districts were free from infection while the districts of Farrukhabad, Cawnpore, Ghazipur and Bahraich registered only small numbers of plague deaths. High rates of mortality were recorded in Jaunpur (1·85), Saharanpur, Mirzapur and Azamgarh (1·05 each), Gorakhpur (0·97), Basti (0·94) and Fyzabad (0·53). Among urban areas, a few recorded very high rates, Sikandarpur (18·24), Mehndawal (8·08), Sarai Mir (8·05) and Mirzapur-Bindachal (6·72).

It is reported that the usual preventive measures were carried out. A total of 187,856 inoculations was done during the year. Rat destruction by baiting with barium carbonate pills and by cyanogas fumigation was also practised in the affected areas. The latter method is more effective than the former as it kills both rats and fleas and it was therefore more widely practised. Government supplied 569 pounds of barium carbonate free to local bodies in the infected areas and grants amounting to Rs. 7,575 were also given to these authorities for cyanogas fumigation. It is reported that evacuation as a preventive measure against plague is becoming popular with the people and that a sum of Rs. 2,775 was placed at the disposal of district magistrates for assisting evacuation and other anti-plague measures. Wherever necessary, temporary regulations under the Epidemic Diseases Act were promulgated to enable the authorities to take preventive measures against the disease.

In Bihar deaths from plague numbered 1,838 in 1938 as against 1,470 during the previous year. The districts of North Monghyr, North Bhagalpur and Purnea remained free from infection during 1938. Saran district recorded the highest number of deaths (1,173) from this disease. Although the incidence of plague has decreased considerably in this province during the last decade, it is reported that certain endemic foci exist, where the disease starts

anew almost every year with the approach of the cold weather. These foci are in the districts of Champaran, Saran, Muzaffarpur, Darbhanga and North Monghyr. As has been shown in the Netherlands Indies an effective method of eradicating plague infection is that of providing rat-proof houses for the population of the affected areas. The plans and specifications of cheap houses suitable for rural conditions, which the health authorities of the Netherlands Indies have found useful, were supplied by the Public Health Commissioner to provincial Directors of Public Health. Experiments for evolving a similar cheap type of house fitted for Indian conditions were carried out at the Cumbum Valley in Madras Presidency by a Research Unit working on the epidemiology of plague under the auspices of the Indian Research Fund Association. Detailed information regarding the type of house evolved at this place, which costs only Rs. 75, was also supplied to Directors of Public Health. A determined effort to popularise the construction of such houses in the endemic areas of plague infection appears to be a hopeful line of advance in our campaign against the disease and it is to be hoped that provincial health authorities will spare no efforts to secure progress in this direction.

The number of deaths from plague recorded in Madras Presidency during 1938 was 1,155 as against 1,127 during the previous year. There was thus little change in the plague situation in this province. Of the total deaths 85 per cent were recorded in the two districts of Salem (540) and Madura (444). Seven municipalities reported plague, 33 deaths being recorded in all.

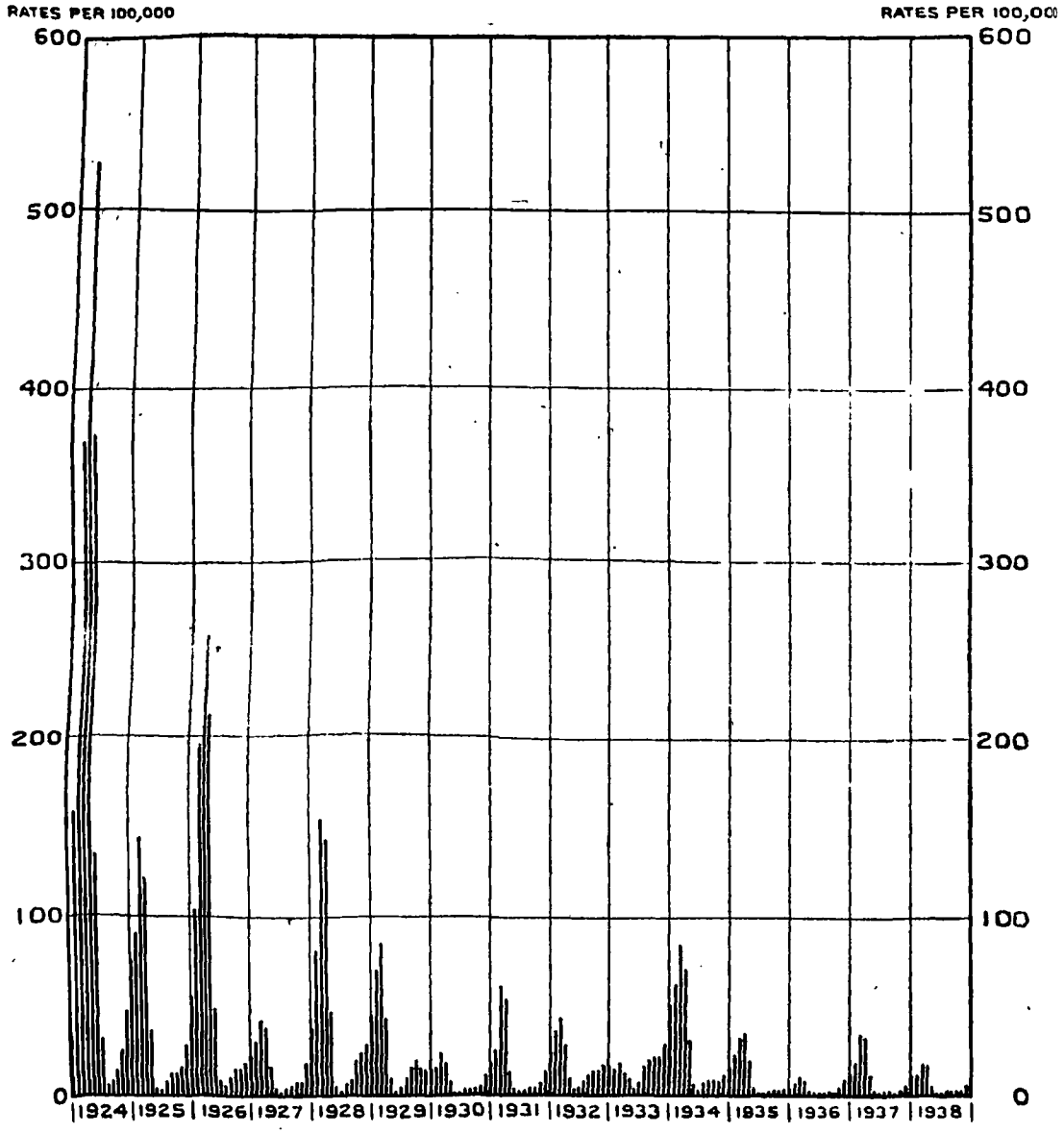
The Madras Government sanctioned, as an experimental measure, routine cyanogas fumigation in seven districts and six municipalities. The cost of the scheme is shared equally between the local bodies concerned and the Government. It is reported that good results have followed the working of the scheme and that the prompt control of plague in two municipalities, Periyakulam and Tiruppur, should be attributed to this measure. Other preventive measures included anti-plague inoculation and evacuation of infected localities, wherever possible. A total of 159,510 inoculations was carried out.

There was a considerable reduction in the mortality from plague in the Central Provinces, from 1,002 in 1937 to 535 in 1938. Deaths from this disease were reported throughout the year except in June. Twelve districts remained free from infection. Of the seven districts which were affected, Jubbulpore reported the largest number of deaths, 263, while Nagpur had only two deaths. Fiftyeight deaths from plague were reported from urban areas. Towns with high death rates were Chota Chhindwara (1·63), Sihora (1·39), Khurai (0·72), Gadarwara (0·66), Saugar and Saugor Cantonment (0·39 each). The usual preventive measures were carried out, the number of anti-plague inoculations being 19,485.

In Bombay Presidency, as in other parts of India, the incidence of plague has been steadily on the decline during recent years. In 1935 plague deaths in the province numbered 2,453, while the figures for the next three years were 578, 506 and 406 respectively. An interesting feature of the epidemiology of the disease, to which the Director of Public Health draws attention, is that the disease seems to have disappeared from certain areas where the infection was considered in the past to be endemic. He states " Kaira and Surat districts in Gujarat and Sholapur, Bijapur, Poona and Ahmednagar districts in the Deccan, which were often visited by plague in the past, are now conspicuous by their freedom from plague for the last three years ".

The importance of an attack on the endemic foci of plague has been recognised and it is reported that intensive cyanogas fumigation operations

MONTHLY PLAGUE MORTALITY RATES PER 100,000 OF ESTIMATED POPULATION IN BRITISH INDIA (EXCLUDING BURMA) DURING 1924-38



carried out in such areas in the districts of the Southern Registration Circle have proved useful " in localising and arresting the infection". During 1938 the districts most affected were Belgaum (194 deaths), Dharwar (84), Satara (74) and Kanara (36). Only eight towns reported plague, the total number of deaths in these towns being 64.

Plague researches are mainly centred at the Haffkine Institute, Bombay, and the following note by the Director of the Institute indicates the work carried out during the year :—

"Studies of the factors which govern the preparation of an effective plague vaccine were continued. It had been observed that in the case of Haffkine broth vaccine, the total protection resided in the clear supernatant fluid of the vaccine and that bacterial debris had little or no protective power. This observation suggested a study of the conditions which would yield a maximum growth of the plague organisms in broth and at the same time result in maximal solution of that portion of the bacterial body which is immunogenic. Quantitative measurements were made during the year to determine the temperature of incubation which would yield maximal growth in broth. First observations show that maximal growth results at 26°—27°C. Similar measurements have been commenced to determine the pH of the liquid medium which would yield optimum growth. At the same time the protein matter in solution in the supernatant fluid of a vaccine was separated into four different fractions with sodium sulphate. Each of these fractions is being studied for its immunogenic value. It appears that the entire immunogenic power resides largely in only one of these fractions, the fraction precipitated with 50 per cent concentration of sodium sulphate.

"The results reported last year of a small field trial of anti-plague serum were very encouraging. One hundred and twentyfour cases were alternatively given serum and control treatment, the mortality rate of 27 per cent of serum treated cases compared very favourably with the mortality rate of 65 per cent of the control cases. Therefore, the production of serum was continued during the year but no opportunity presented itself for a fresh field trial. In spite of the undoubted curative power of the serum, the question arises whether under Indian conditions an anti-plague serum could become a practical remedy. The disease is almost entirely limited to rural areas, which lack adequate medical personnel for medical relief. Under Indian conditions the new sulphanilamide derivatives offer a decidedly better alternative for dealing with the disease, if a suitable derivative could be found. Studies were, therefore, undertaken to test the value of some of the more important drugs available on the market. Prontosils, sulphanilamide and sulphanilamido-pyridine were tested. In human infection it was noticed that the onset of septicaemia was the deciding factor in the result of the case. Thus to make the laboratory tests correspond to the severe form of the human disease, the administration of the drugs under test was commenced only after the experimental animal, white mouse, has developed septicaemia. Under these severe conditions of test the drugs tested did not show any definite curative properties. Experiments are in progress to test the action of these drugs under less severe conditions of infection."

Smallpox.

16. In table II (*iii*) are presented the quinquennial average figures for smallpox mortality in British India during the period, 1877—1936, as well as the deaths from this cause in 1937 and 1938.

TABLE II (*iii*).

Periods.	Annual average.
1877—81	162,942
1882—86	149,777
1887—91	95,831
1892—96	73,816
1897—01	84,265
1902—06	84,914
1907—11	94,534
1912—16	79,214
1917—21	84,828

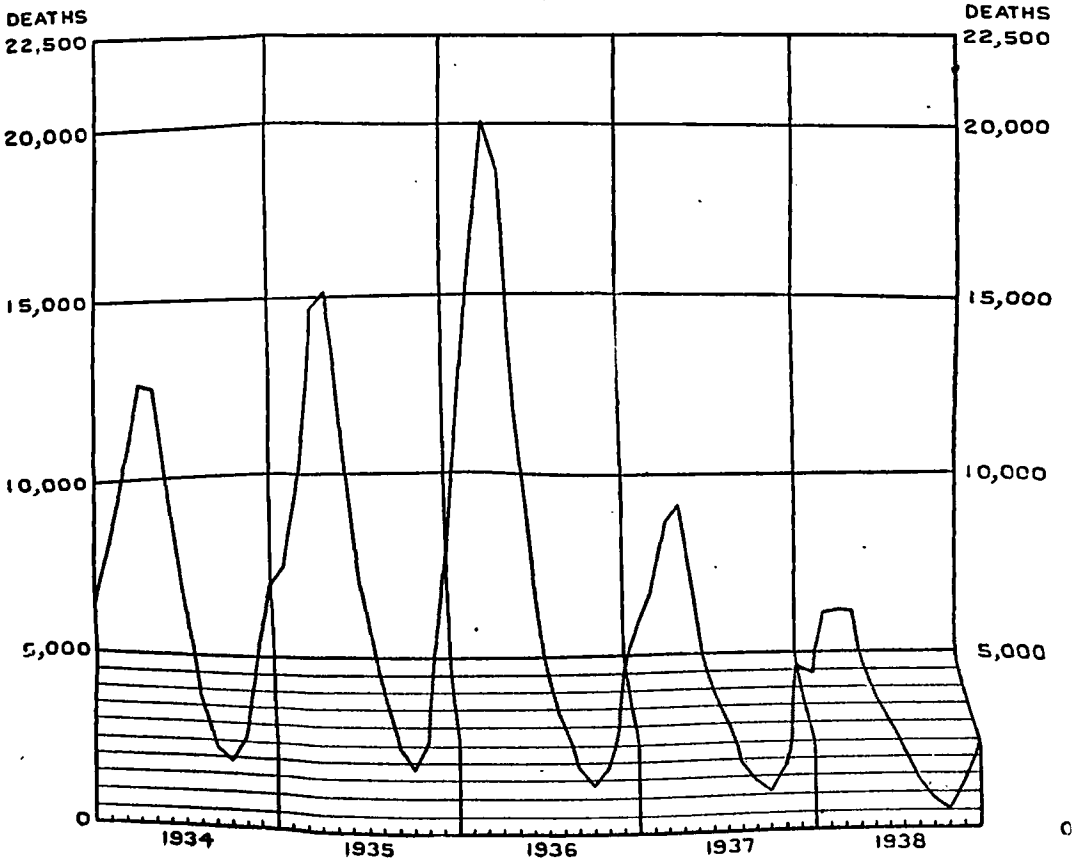
Periods.	Annual average.
1922—26	66,075
1927—31	77,902
1932—36	83,959
1937	54,810
1938	39,844

The last two years have seen a decrease in the incidence of the disease and there has been a drop of nearly 15,000 deaths in 1938 compared with the previous year. However the quinquennial averages indicate that the prevalence of smallpox has been subject to considerable variation and it is not therefore correct to assume that the disease will continue to decrease. While a reassuring factor in the situation is that provincial health authorities are taking an increasing interest in the enforcement of vaccination, which is the most powerful weapon we possess in our fight against smallpox, it is necessary to emphasise, as has been done repeatedly in previous reports, that serious deficiencies exist in our vaccination campaign and that these have to be rectified before India can get rid of this disease. At present India records each year the largest rate of mortality from smallpox in comparison with other countries. In her own interests and those of the rest of the world, which look upon India as the largest reservoir of this infection, it is essential that everything possible should be done to enforce vaccination and thus reduce the incidence of smallpox.

A striking feature of the epidemiology of smallpox in India, to which the Directors of Public Health of several provinces have drawn attention, is a periodicity in the incidence of the disease, the maximum being reached every five or six years. The opinion of these health authorities is that, owing to defects in the enforcement of vaccination, the proportion of susceptible children steadily increases during this period and that the situation is thus rendered favourable for the production of a widespread epidemic. In this connection certain figures relating to the Punjab and Delhi may be quoted. In the former, while the proportions of children aged 0—1 and 1 to 10 to the total estimated population in 1938 were 3·7 and 25·5 per cent respectively, of the total smallpox deaths at all ages during the same year, the percentages relating to children in these two age groups were 28·1 and 50·2 . In Delhi province, infants under one year and children aged 1—5 formed 3·2 and 9·2 per cent of the total population, while the corresponding rates of smallpox mortality were 23·5 per cent and 37·3 per cent. It is thus clear that the incidence of the disease has been particularly heavy at these ages. An effective campaign of primary vaccination should have given a considerable measure of protection to these children. A high proportion of smallpox mortality among children is a feature prevalent throughout the country and it gives unmistakable proof of the inadequacy of the measures adopted for enforcing vaccination.

The present inefficient campaign of vaccination is due to many causes, of which some of the important ones are defective registration of births in urban and rural areas resulting in the omission of large numbers of children from the register maintained for unprotected persons, the absence of powers of compulsion for local authorities to enforce vaccination in many parts of the country, lack of legal provision for periodical revaccination and the inadequacy of the staff employed for vaccination. It is essential that all these defects should be remedied as early as possible. At the same time, even under existing conditions, it may be possible to increase the number of vaccinations performed if local authorities will utilise the services of their health personnel to the fullest possible extent and introduce other changes in the existing methods of procedure. For instance, the services of sanitary inspectors, midwives and health visitors should all be available for vaccination. They have innumer-

SMALLPOX DEATHS BY MONTHS IN BRITISH INDIA, EXCLUDING BURMA, DURING 1934-38.



DISTRIBUTION OF SMALLPOX MORTALITY DURING 1938

INDEX.

0·5 to 2·0 per mille .....

0·1 to 0·5 „ „ .....

Below 0·1 „ „ .....

Areas reporting no mortality

Reports not received .....

Major Ports (total deaths) ... ⑤,O

able opportunities of contact with the people in the daily discharge of their duties and these occasions should be utilised for enquiring into the vaccinal condition of the inhabitants of the houses they visit and of conferring protection on those who need it. The health visitor and the midwife have the additional advantage that they have access to the women and children in the homes and if they can win the confidence of the women, the battle against prejudice and ignorance is easily won.

Another important change that may be carried out with advantage is to extend the period during which vaccination is performed to all the twelve months of the year. In certain provinces vaccination is suspended during the summer, except in the presence of an epidemic. In consequence the period of vaccination is mainly confined to the cold season. Two of the reasons advanced for the maintenance of this system are that the vaccine lymph is rendered ineffective by the heat and that the people dislike being vaccinated in the hot weather. The Chief Health Officer, Delhi, states that neither of these reasons should prove to be a deterrent. In his experience, the percentage of successful vaccinations during the hot months in Delhi province is as high as that for vaccinations carried out in the cold weather. The opposition shown by the people to the performance of the operation during the hot weather can be overcome, he thinks, by methods of persuasion. It is true that Delhi is a small province and that rapid means of communication are more available here than in the outlying parts of other provinces. Deterioration in the quality of the vaccine lymph depends partly on the length of time that elapses between its issue from the central vaccine institute and its utilisation for the vaccination of the people. It may be that undue delay in the transit of vaccine lymph to certain distant areas of some provinces may make it desirable to suspend vaccination in those areas during the hot months, but there is no reason why vaccination should not be carried on during all the twelve months of the year over the greater part of these provinces. Delhi registers very high temperatures during the hottest months of the summer and a scheme which has stood the test in this province should prove to be applicable to other parts of India as well.

The wide distribution of smallpox during 1938 in different parts of the country and the variation in the intensity of its incidence may be seen from the map facing this page. Death rates from smallpox in the rural and urban areas are given for British India as a whole and for the provinces in table G of Appendix II. For British India the rural rate was 0·1 *per mille* and the urban 0·3 *per mille*. In the provinces the rural rate varied from 0·01 in the Central Provinces to 0·5 in Ajmer-Merwara and Orissa. In urban areas the corresponding figures were 0·4 *per mille* in Assam and 1·9 *per mille* in Ajmer-Merwara.

The monthly distribution of the disease is shown in table H of Appendix II. In British India the maximum mortality from this cause was recorded in April. Each of the first and second quarters of 1938 registered more than three times the numbers of smallpox deaths recorded in either of the remaining quarters of the year. The incidence of the disease was therefore preponderantly in the first six months, an experience which is shared by all the provinces.

Brief remarks on the incidence of smallpox in individual provinces are given in the following paragraphs:—

The N.-W. F. Province recorded a larger number of smallpox deaths in 1938 than in 1937, the figures being 1,065 and 973 respectively. The districts

giving high death rates were Peshawar (1·08) and Hazara (0·37) while Kohat (0·20) and Bannu (0·13) were the least affected. It is stated that mass vaccination was carried out in the infected localities and the surrounding areas.

There was an increase of 1,464 deaths from smallpox in the Punjab in 1938 compared with the previous year, the recorded figures for the two years being 5,455 and 3,991 respectively. All the districts were affected except Simla. Of the total smallpox deaths in 1938, 811 were registered in towns and 4,644 in rural areas.

Delhi province recorded a considerable fall in smallpox mortality, the figure for 1938 being 90 as against 643 during 1937. Sixtyfour per cent of the cases are stated to have occurred in Delhi city.

Mention has already been made of the attempts made in this province to continue the practice of vaccination during the hot weather and to utilise the services of all members of the subordinate health staff as far as possible, to carry out vaccination. The results are reported to have been quite encouraging. In 1937 the number of vaccinations performed was 28,693 while in 1938 the figure rose to 72,523, an increase of 43,830. It seems fairly certain that, if these improvements can be introduced in other parts of India also, there should be a considerable increase in the proportion of those who are protected against the disease and, in the course of a few years, such a policy is bound to have a beneficent effect on the health of the population by putting an effective check on the periodical epidemics of smallpox which sweep the country.

The number of deaths from smallpox in the United Provinces during 1938 was 4,411 as against 3,200 in 1937, an increase of 1,211. The highest mortality was recorded in May and the lowest in October. The districts of Bulandshahr, Jaunpur and Agra returned high death rates of 0·4, 0·26 and 0·25 *per mille* respectively. Garhwal, Rae Bareli, Kheri reported only one and Sultanpur two deaths during the whole year while Pilibhit and Bara Banki were free from infection. In urban areas, of 440 towns 144 reported mortality from smallpox. High rates were recorded in Kamalganj (10·0), Pahasu (8·9), Safipur (8·6) and Rabupura (7·3).

Bihar recorded a fall in smallpox mortality from 7,485 in 1937 to 5,977 in 1938. High rates were reported from the districts of Palamau (0·5), Gaya (0·4) and Saran (0·4), while Hazaribagh (0·02) recorded the lowest rate. Among towns the worst affected were Gaya (1·5), Muzaffarpur (1·3) and Monghyr (1·1). It is reported that, during 1938, the total number of vaccinations performed was 1,500,764.

It is reported that, in Orissa, smallpox is endemic in the coastal districts and that high rates of mortality from the disease were recorded from those areas where vaccination has not been made compulsory.

In the districts of North Orissa it is stated that a system of vaccination is in force by which the people are required to pay the licensed vaccinator a fee for the operation. Vaccination is not compulsory in such areas and it is therefore only to be expected that no satisfactory progress is being made in the vaccination of the population. But the Director of Health and Inspector General of Prisons reports that local bodies are growing alive to the necessity of introducing compulsory vaccination. It is to be hoped that the introduction of compulsion and of a free service to the people will make for a rapid increase in the proportion of those who are protected against the disease. Without this no improvement of the existing situation can be expected.

The number of smallpox deaths in the province during 1938 was 3,321 against 2,269 in 1937. Its maximum incidence was reached in the month of March. The total number of vaccinations carried out during 1938 was 644,258.

In Bengal there was a considerable fall in smallpox mortality during 1938, the figure being 9,289 as against 27,944 in 1937. Compared with the previous quinquennium the death rate from this disease in 1938 is stated to have shown a decrease of 50 per cent. The largest number of deaths from this cause was recorded in March and then there was a gradual decline till the minimum was reached in November. Of a total of 712 registration circles 461 were affected and 2,599 villages out of 86,361 in the province reported cases.

Although the number of cases in 1938 was much less than in 1937, it is reported that the disease spread over a wider field during the year under report. Thus, while in 1937 the number of towns which escaped infection was 70, in 1938 only 47 towns were free. Of the total deaths in towns (2,654) Calcutta city alone accounted for 2,193 deaths or 82·6 per cent.

In the Central Provinces there was a small decrease in the number of deaths recorded under smallpox, from 460 in 1937 to 409 in 1938. Deaths from this disease were reported from all districts, except Drug and Balaghat, which remained free. The highest incidence of smallpox was in April. The largest number of deaths was recorded in Nimar district (196) and the smallest in Amraoti (14).

Bombay Presidency recorded a large increase in smallpox mortality, from 1,810 in 1937 to 4,355 in 1938. The disease was reported from 1,124 villages in 167 registration circles. The largest number of deaths was recorded in March but the incidence of the disease was high from January to May. The highest incidence of the disease was in Ratnagiri with a death rate of 0·6 *per mille* and the lowest in Dharwar with only two deaths. Bombay city recorded 1,856 deaths from this cause or 42·6 per cent of the total figure for the province. Other towns with a high death rate from smallpox were Panwel (1·78), Bassein (1·42), Chiplun (1·30), Bagalkot and Nasirabad (1·15) and Bhatkal (1·01).

An examination of the recorded smallpox deaths in Sind during the period 1928-38 shows that the incidence of the disease has been subject to considerable variation. For instance, the recorded deaths were as low as 179 in 1928 and as high as 1,093 in 1933 and 1,553 in 1932. In 1938 there was an increase in smallpox mortality over that for 1937, the recorded figures in the two years being 941 and 798 respectively. Of the total deaths from this cause, 70 were recorded in urban areas and 871 in rural areas. Among the affected towns, high smallpox death rates were registered in Garhi Yasin (1·08), Kambar (0·82) and Ratodero (0·55). Among the rural districts Larkana (0·73), Thar Parkar (0·46) and Nawabshah (0·30) reported high rates. Temporary additional staff were appointed and a vigorous campaign of vaccination was carried out in the affected areas.

In Madras Presidency a steady decline in smallpox mortality has been noticed since 1934, the number of deaths from this cause in that year being 18,088 and the corresponding figure for 1938, 2,273. It is stated that the year under review has recorded the smallest mortality from this disease compared with the previous 71 years. The Director of Public Health draws attention to two other significant facts. Since 1929 the ratio of deaths from smallpox among children under one year to the total deaths from this cause at all ages has been declining steadily. The corresponding figure for children

aged 1 to 10 was stationary in the neighbourhood of 30 per cent till 1935 and has since that date shown a tendency to decrease. On the other hand the proportional mortality from smallpox among persons over 10 years of age has so far been steadily increasing. These facts indicate that the campaign of primary vaccination in children has been successful in reducing the incidence of the disease at ages below 10. A similar vigorous revaccination campaign among persons over 10 years of age will undoubtedly reduce the incidence of the disease in the adolescent and adult population. The Government of Madras took powers, a few years ago, to carry out revaccination compulsorily and it is to be hoped that the enforcement of these powers will go a long way to achieve the desired result.

All the districts in the province were affected, but East Godavari, the Nilgiris, Bellary, Kistna and Tinnevelly reported only stray cases. The death rate from the disease was less than 0·10 *per mille* in all the other districts except Chingleput and South Arcot which reported 0·24 and 0·12 *per mille* respectively.

Among urban areas, 31 municipalities reported the disease and a total of 735 deaths was recorded in these towns. Of these 735 deaths Madras city alone accounted for 76 per cent. Other municipalities reporting high mortality were Saidapet (23), Nellore (19) and Salem and Kurnool (18 each). The number of deaths registered under smallpox in Assam during 1938 was 1,649 compared with 2,187 in 1937, a decrease of 538 deaths. Infection was reported from 67 registration circles and from 618 villages. The largest number of deaths was recorded in May and the lowest in September. The smallpox death rate for the province was 0·21 *per mille*. Nowgong (0·63) and Sylhet (0·44) recorded the highest rates. Among towns, only four reported deaths from this disease and the total number of deaths in these towns was only eight.

In Ajmer-Merwara, the number of deaths from smallpox in 1938 was 577 as against 595 in 1937. There was therefore little change in the smallpox situation.

In Coorg three smallpox deaths were registered during the year under review and these occurred in the rural areas.

Fevers.

17. The number of deaths in British India classified under the omnibus group of diseases entitled "fevers" in 1938 was 3,883,627 or 14·1 *per mille* of the population out of a total death rate of 24·3 from all causes. In 1937 the corresponding rate for fevers was 13·1 *per mille*. The provincial rates for this group of causes are given in table A of Appendix II of this report. For British India as a whole, the rural and urban rates for fevers were 14·8 and 7·7 respectively. As usual, malaria contributed much the largest share to the total deaths under this head, the figure being 1,577,865 or nearly 41 per cent of the deaths due to fevers.

In the N.-W. F. Province the number of deaths from this cause rose from 39,979 in 1937 to 41,622 in 1938. The districts of Hazara, Kohat and Dera Ismail Khan recorded high rates, *viz.*, 21·1, 20·5 and 20·2 respectively. The lowest rate was recorded in Mardan district, namely, 13·4, which is itself a high figure. The rural and urban fever death rates for the whole province in 1938 were 7·7 and 19·4 respectively compared with 8·1 and 18·5 in 1937.

It is reported that, in the Punjab, febrile illnesses accounted for two-thirds of the total mortality. Although no great reliance can be placed on the reported causes of death under this head, it is interesting to compare the numbers recorded under each disease :—

Malaria	5,015
Enteric fever	10,245
Measles	5,166
Relapsing fever	13
Influenza	25
Cerebrospinal fever	70
Typhus	3
Other fevers	389,661

In 1938 an increase of 66,356 deaths was recorded under 'fevers' compared with the previous year and it is stated that a sudden rise in the figures took place in May and June, which the Director of Public Health considers to be "a fairly regularly recurring phenomenon in years when malaria is not unduly prevalent". The year under review was such a year and it is stated that no explanation has been found for this rise in fever mortality.

The United Provinces also recorded an increase in fever mortality from 792,263 in 1937 to 940,469 in 1938. The largest number of deaths was recorded in May and the lowest in March. Of the total deaths under this head, 819,057 or nearly 87 per cent were registered under malaria. Among urban areas very high death rates from this disease group were recorded in Amanpur (55·3), Jalalabad (45·1), Fatehabad (41·1) and Alapur (38·7). Low rates were reported from Behat (0·86), Mussoorie (0·81) and Juhi (0·75). In the rural areas, the districts of Bareilly (31·1), Pilibhit (30·5), Bijnor (28·8) and Moradabad (28·2) reported high rates while Allahabad and Ballia recorded the lowest rates, 12·4 and 11·1 respectively.

Fevers accounted for 54·5 per cent of the total mortality in Orissa during 1938, giving a rate *per mille* of 16·0 compared with 15·2 in 1937. High rates were recorded in Khondmals (30·0), Angul (22·0) and in the district of Balasore (22·1). Among the towns, Kendrapara (15·1), Jaipur (11·2) and Balasore (10·0) reported high death rates from this group.

The Director of Public Health, Bengal, in his annual report states that "the progressive rise in fever mortality from year to year mainly due to the growing scourge of malaria is the most important public health problem of the province". The rate of mortality under this group of causes rose from 14·9 *per mille* in 1937 to 15·6 in 1938. An interesting map in the report showing the increase in fever mortality in the districts during 1938 over the average for the previous ten years shows that, with the exception of the central and northern districts of Rajshahi, Malda, Dinajpur, Jalpaiguri and Darjeeling and the south and central districts of Khulna and Jessore, the remaining parts of Bengal have shown a rise in deaths due to fevers. The whole of eastern Bengal and western Bengal with the exception of Howrah district have been affected.

While, as pointed out by the Director of Public Health, this rise has been largely due to the increase in the incidence of malaria, it is interesting to compare the figures under different diseases included in the 'fever' group, which the Director has given in his report. It is true that but limited significance can be attached to the absolute value of these figures in view of the defective organisation for recording the causes of deaths, but these defects cannot possibly detract from their relative value for a comparison between the years 1937 and 1938.

Fever deaths in Bengal in 1937 and 1938.

Causes.	Number.		Death rates *per mille*.		Percentage of increase or decrease in 1938.	Percentage to total fever mortality.	
	1937.	1938.	1937.	1938.		1937.	1938.
Malaria . .	372,992	416,521	7·5	8·3	+10·6	48·1	50·8
Enteric fever .	8,978	9,808	0·18	0·20	+11·1	1·1	1·2
Measles . .	4,875	2,969	0·10	0·06	—40·0	0·6	0·4
Relapsing fever (spirochaetal).	2	3	0·00004	0·0001	+50·0	0.0003	0·0004
Kala-azar .	21,227	21,642	0·42	0·43	+2·4	2·7	2·6
Influenza . .	2,422	2,143	0·05	0·04	—20·0	0·3	0·3
Cerebrospinal fever.	938	1,337	0·02	0·03	+50·0	0·1	0·2
Typhus fever .	2,814	4,034	0·06	0·08	+33·3	0·4	0·5
Blackwater fever	229	212	0·004	0·004	±0	0·03	0·03
Other fevers .	361,109	361,094	7·2	7·2	±0	46·5	44·1

Large increases have been recorded under malaria, enteric fever, kala-azar, cerebrospinal fever and typhus.

The urban areas in the province returned a death rate from fever of 4·5 *per mille* and the rural areas of 17·3 *per mille*. Fortythree towns registered rates above the urban average rate of 4·5 *per mille*, while of these 10 returned rates above 10 *per mille*. The lowest rate was in Dum Dum, namely, 0·7 *per mille*. Kurseong was the worst affected town in 1938.

In the Central Provinces deaths from fevers numbered 322,404 during 1938, giving a rate of 21·0 *per mille* against 18·4 in 1937. The urban and rural death rates were 13·1 *per mille* and 22·0 *per mille* respectively. Among the districts, Bilaspur, Raipur and Saugor reported large numbers of deaths from fevers while Buldana, Wardha and Betul reported relatively small numbers.

There was an appreciable increase in the number of deaths recorded under fevers in Bombay Presidency during 1938 as compared with the previous year, the respective rates being 10·4 and 9·2 *per mille*. In 1938 the urban and rural death rates under this head were 6·1 and 11·4 respectively. High rates were reported from the towns of Ankleshwar (25·4), Nadiad (23·8), Borsad (22·1), Rander (22·0), Viramgaon (21·0) and Jambusar (20·2). Among the rural areas the talukas of Sanand (31·4), Parola (25·9), Daskroi (24·6), Edalabad (23·9) and Jalgaon (22·4) recorded high rates of death from fevers.

In Sind fevers were responsible, in 1938, for 27,970 deaths or a rate of 7·2 *per mille* as against 7·1 during the previous year. Among the districts Larkana recorded the highest rate, 10·4 *per mille*, and Karachi the lowest (3·1). Rural and urban rates for the province were 7·9 and 4·1 respectively. Among rural areas high rates were recorded in Ghotki (15·5), Sukkur (13·9), Pano Akil (12·0) and Garhi Yasin (11·8) while Kohistan Mahals (1·9) and Keti Bunder (1·8) reported low rates.

In Assam fever mortality during 1938 reached its maximum in June and its minimum in March. For the province as a whole a decrease occurred in the rate for deaths from this group of causes, the respective rates during 1937 and 1938 being 13·0 and 12·4 *per mille*. Among the districts Goalpara recorded the highest rate, 23·1 *per mille*, and Nowgong the lowest, 8·8 *per mille*.

Malaria.

18. The following table gives the number of cases of malaria treated in the medical institutions of British India and the different provinces and the percentages that these cases constitute of the total number of cases of all

diseases treated. While the figures represent only small fractions of the numbers of malaria patients in each province the percentages in the last column may have some value in showing the relative importance of the disease in the different provinces.

TABLE II (*iv*).

	Cases.	Percentage of total cases treated.
British India	12,160,908	13·8
N.-W. F. P.	533,119	19·7
Punjab	1,494,267	8·7
Delhi	79,988	8·9
U. P.	1,068,949	10·2
Bihar	503,383	6·0
Orissa	344,020	15·6
Bengal	4,296,758	33·9
C. P.	705,381	15·4
Bombay	681,570	15·7
Sind	263,466	21·7
Madras	1,276,658	6·4
Coorg	133,278	38·1
Assam	662,694	29·8
Ajmer-Merwara	13,255	6·6
Baluchistan	104,122	15·5

In British India as a whole the number of deaths registered as being due to malaria was 1,577,865 in 1938, of which nearly 96·4 per cent took place in rural and the remainder in urban areas. The corresponding mortality rates from malaria were 6·1 *per mille* in rural and 2·2 *per mille* in urban areas. The incidence of the disease in the villages appears therefore to have been much higher than in the towns.

A brief review of the malaria problem in India and of the lines on which the campaign against the disease is being conducted was given on page 238 of the 1937 report. It is therefore unnecessary to make further comments on the subject here and the following paragraphs are therefore devoted to a survey of the incidence of malaria in the different provinces during 1938 and of the measures adopted against the disease, including quinine distribution among the population.

In the N.-W. F. Province it is reported that malaria continued as usual to be the most prevalent disease. Anti-malarial measures were carried out in all the municipal towns in the province, oiling of water collections, drainage of pools and filling up of depressions being carried out by the special staff employed by municipal authorities. In Abbottabad, Peshawar, Kohat, Bannu and other cantonments the military medical authorities carried out anti-malarial measures within their areas and in the surrounding regions also. The usual grant of Rs. 1,000 was paid by the provincial Government to the Kohat military authorities for carrying out these measures in the neighbouring villages and it is stated that these villages have low spleen rates.

For the rural areas the only measure that was feasible was the free supply of quinine to the people. In Hazara district, where a severe epidemic took place, a special doctor was deputed who, among other things, carried out a malarial survey of the schools. In Peshawar distribution of quinine was done through special compounders while in a badly infected tehsil of Bannu, an experiment was tried of opening 20 treatment centres for quinine distribution. These centres were visited by a specially trained compounder. The scheme is said to have been popular and will therefore be repeated. Anti-malarial work was also carried out among the Frontier Constabulary and in the Police Training School with a considerable measure of success, it is stated, in reducing the morbidity rate. A certain amount of work was also done in the Agencies, the Agency Surgeon offering advice and instruction regarding anti-malarial measures during his tours.

The number of deaths recorded as due to malaria in the Punjab in 1938 was 5,015, a figure which the Director of Public Health states underestimates to a large extent the actual mortality from this cause. On the other hand, he points out that, if a third of the deaths due to fevers be accepted as having been due to malaria, the figure would be 136,732, which would appear to be unduly high from a consideration of the distribution of deaths due to febrile illnesses over the year.

Anti-malarial measures, apart from quinine distribution, were carried out only to a limited extent in urban and rural areas except in the vicinity of military cantonments. It is reported that joint schemes for the control of mosquito breeding were formed by the military, civil and railway authorities in these areas.

As the province has not suffered from a severe fulminating epidemic of malaria since 1908, the possibility of an extensive outbreak cannot be dismissed in view of the lowered immunity of the population and, to meet this contingency, it is stated that the nucleus of an anti-malarial organisation, capable of expansion when the occasion arises, has been established in every district. The necessary material and equipment have also been supplied to the districts.

The comprehensive scheme of anti-malaria works which are being carried out in Delhi urban areas and to a smaller extent in the rural parts of Delhi Province has been described in the annual reports for 1936 and 1937. The results of the ant-imalaria campaign may be judged from the following figures for spleen rates of school children in Delhi urban area in July 1936 before the commencement of the control measures and in November 1938:—

	Spleen rate.	
	July 1936.	November 1938.
Ward XI	23	5
Ward XII	28	7
Ward XIII	14	2
Ward XIV	18	3
Jumna Village	68	19
Power House quarters	90	22
Sewage Farm quarters	68	4
Railway quarters, Paharganj	21	1
Railway quarters, Sabzimandi	68	6
Nizamuddin	72	44
Jangpura	70	13

The decreases in the spleen rates are striking in every case and, although a certain proportion of it should be attributed to the deficient rainfall during the year, it is certain that the anti-malarial measures were in a large measure responsible for the excellent results.

The figures for fevers recorded at the Delhi dispensaries between July 1st and November 30th, the usual period of malarial incidence, also give an indication of the measure of control that has been achieved. In 1938 the figure was 29,042 compared with 36,204 in 1937 and 59,632 in 1936. The Director, Malaria Institute of India, states that the figure for 1938 would have been much smaller except for the occurrence of an outbreak of influenza. " This is borne out by the fact that the total figure recorded in the first week of October, normally the height of the malarial season, was 1,235, whilst the figure for the last week of November was 1,562. It is doubtful whether as many as 10 per cent of the latter number were actually cases of malaria."

Considerable nuisance used to be caused every year in March and April by a large increase in the breeding of Culex mosquito in the sewage farm lying to the south-east of New Delhi. During 1938 a large part of the farm was brought under control by the draining and oiling of stagnant pools and a considerable measure of relief resulted in consequence of these measures. In September 1938 this farm was abandoned and the nuisance disappeared.

The anti-malaria operations in the rural areas of Delhi Province fall into three groups, (1) measures carried out in a three-mile belt surrounding the urban area, (2) operations in Najafgarh thana and (3) operations in other areas. In regard to the three-mile belt, the measures adopted included, in addition to certain permanent works carried out as part of a scheme spread over a number of years for its execution, the issue of quinine for the treatment of patients in all the 60 villages within the ' belt ', anti-larval operations and minor drainage works in a group of 10 villages south of the Nizamuddin Chord Line and the spraying of adult mosquitoes in a group of eleven villages, six in the irrigated area and five in the sewage farm area. These villages can be divided into three groups, (1) those which had quinine alone, (2) those which had quinine and anti-larval measures and (3) those which had quinine and adult spraying

Discussing the value of anti-larval measures the Director, Malaria Institute of India, states that, while the average ' catch ' in five catching stations fell from 25·8 per week early in July to 5·3 in the middle of October, it is impossible to estimate what part of this improvement may be ascribed to the measures adopted and what part to the failure of the rains. At the same time the fact that this group of villages has shown the largest fall in the spleen rate lends support to the value of the anti-larval measures although the high cost (15 annas per head) makes it impossible to extend these operations on a large scale. As the Director points out, the main value of these operations is the ultimate hope of educating the villagers in the value of these operations and of persuading them to undertake levelling, filling and drainage works on their village site for the benefit of their own health.

Adult spraying was carried out with " Pyrocide 20 " diluted with kerosene oil in the proportion of 1 in 20. It is stated that the spraying was quite popular among the people because it afforded them immediate relief from the mosquito nuisance. The cost of such spraying has been brought well within the means of the villagers, the Pyrocide solution for the malaria season costing only Rs. 1-6 per house and the spray pump, with due care, being able to last for several years. It is therefore to be hoped that spraying as an effective method of attack on adult mosquitoes will be adopted by the rural population in course

of time. In the Najafgarh thana quinine distribution was restricted to 24 villages which were within easy reach of each of the welfare centres in the area, anti-larval measures were carried out around every village in the thana and adult mosquito spraying was done only in ten villages in the vicinity of the welfare centres. The services of the health visitors attached to these centres were utilised to demonstrate the use of the spray to the womenfolk in the villages and to enlist their co-operation in the carrying out of the anti-malarial measures.

Quinine distribution, minor levelling, draining and filling operations and mosquito spraying were also carried out, to a limited extent, in the other rural parts of the province. Twentyone quinine distribution centres were instituted in different parts of the province, sanitary inspectors and sanitary assistants regularly visiting these centres and distributing quinine tablets to the people. The filling and levelling operations were supervised by sanitary baildars along with their other duties. Spraying was confined to 38 villages during the months July to October.

In the United Provinces, 819,057 deaths were registered under malaria in 1938, these constituting about 65 per cent of the total deaths from all causes. The Director of Public Health considers that this is far too high a figure and states that the tendency, particularly for the rural registering authorities, is to put down all cases of death accompanied by high fever as malaria and that this tendency varies from district to district. A verification of deaths from malaria, which was carried out, showed that "the percentages of malaria deaths recorded correctly varied from 6 per cent to 75 per cent in rural areas and from 14 to 100 per cent in urban areas." Eighteen districts reported localised outbreaks of malaria, which were, however, not of a serious nature.

Four hundred and eightynine pounds of quinine sulphate tablets were distributed to 48 districts for the treatment of the rural population. In addition 1,304 pounds of quinine and 338 pounds of cinchona febrifuge tablets were issued from the provincial reserve to 21 districts for the replenishment of their stock. It is stated that, according to an estimate made by the Inspector General of Civil Hospitals, 1,709 pounds of quinine and 1,716 pounds of cinchona febrifuge were consumed in the province during 1938, giving an average of 22·5 grains per patient with a total of 1,068,949 cases of malaria treated.

An intensive anti-malarial investigation, financed partly by the provincial Government and partly by the Government of India, through the Indian Research Fund Association, was in progress during the year at two centres, Bazpur and Hardoi. The aim is to evolve cheap and effective methods of control under rural conditions. It is too early yet to report results.

A treatment scheme was in operation in about 250 villages with a population of 24,000 in the Terai and Bhabar Estates. In all 14,941 patients were treated. Further, under a mass treatment scheme with cinchona febrifuge and plasmochin in selected malarious villages in the districts of Hardoi, Unao and Lucknow, 948 cases, including relapse cases, received treatment. Anti-larval measures were carried out in a number of villages.

In Bihar the areas which show a high incidence of malaria are stated to be (1) a long narrow belt of territory in North Bihar contiguous to Nepal, (2) certain endemic areas in the districts of Champaran and Purnea, (3) a group of villages on the outskirts of the Chota Nagpur plateau and the river ghats in Gaya district and (4) certain scattered areas in the districts of Ranchi, Hazaribagh, Palamau, Singhbhum and Manbhum.

Muzaffarpur district suffered from a severe epidemic of malaria and, to cope with the situation, a number of special treatment centres was opened. Arrangements were also made for the distribution of quinine through Health Inspectors, Union Boards and through voluntary organisations. Clearing of vegetation and other anti-mosquito measures were also carried out in a number of places. The Government made a grant of Rs. 31,000 and the District Board contributed Rs. 7,600 towards the expense. The Government also supplied, free of cost, 1,425 pounds of quinine and the services of six doctors were made available for combating the epidemic. In the districts of Bhagalpur, Purnea, Darbhanga, Champaran and Monghyr, where also large scale epidemics of the disease took place, similar active measures were taken for the treatment of patients and for preventive work and Government offered help to the local authorities by grants from the provincial funds and by the free supply of large quantities of quinine.

The Assistant Director of Public Health, Chota Nagpur Circle, carried out the spleen examination of 9,340 children in 1,156 villages in the districts of Ranchi, Santal Parganas, Singhbhum and Hazaribagh, the rates being 8·3, 2·0, 8·3 and 5·2 per cent respectively.

It is reported that malaria was prevalent throughout the province of Orissa in a more or less epidemic form during 1938. In Ganjam district the coastal villages of Chatrapur, Kodala and Berhampur North Ranges are reported to have been severely affected. Similarly the districts of Puri, Cuttack and Balasore suffered from widespread epidemics of the disease. Preventive work was carried out in these areas by the appointment of temporary staff and by the free supply of quinine by the district boards and by the Government. Antimalarial operations were also carried out in limited areas. Special mention may be made of such operations in Koraput, Jeypore, Pattanghi and Malkangiri in the district of Koraput at a total cost of Rs. 6,548. The Director of Health states that, owing to lack of funds, anti-malarial schemes for certain local areas in the badly affected districts could not be taken up during the year.

The Director of the Malaria Institute of India visited the province in September 1938 and inspected certain areas for studying the malaria problems. He was of opinion that, as practically nothing was known of the Anopheline vector or vectors responsible for the transmission of the disease in different parts of Orissa, the deputation of a research unit from the Malaria Institute for carrying out local investigations was the first step to be taken in attempting a scientific control of the disease.

It is stated that, in 1938, malaria accounted for 50·8 per cent of the total mortality from fevers in Bengal and 31·6 per cent of the deaths from all causes in the province. The Director of Public Health points out that in Bengal 93 per cent of the population live in villages and the remaining 7 per cent in towns while the proportions of malarial deaths in 1938 were 99·3 per cent for rural and 0·7 per cent for urban areas. These facts give some indication of the extent to which malaria constitutes a menace to the health of the rural population. The Director considers that, if the malaria problem can be solved, three quarters of the victims of preventable disease in the province will have been saved.

In 15 out of 27 districts the death rate from malaria in 1938 was above the provincial average of 8·3 *per mille*. Eleven districts reported rates above 10 *per mille* and, of these, Rajshahi (19·0) had the highest figure. Sixteen districts recorded rates varying from 1 to 10 *per mille*, while Calcutta (0·7) had the lowest death rate from malaria during the year under review.

In regard to quinine supply the Director states that the malaria patients in the province require 350,000 pounds of the drug every year for adequate treatment. The total amount used in the province during 1937-38 was 112,353 pounds, of which 51,839 pounds were produced locally and the balance of 60,514 pounds were derived from foreign sources. The maximum capacity of quinine production in the provincial quinine factory is stated to be 60,000 pounds and the Director points out that immediate efforts are necessary to make the province self-sufficient in regard to the supply of quinine.

A comprehensive malaria survey, consisting of intensive investigations in selected villages in highly malarious areas, was started in November 1937 and continued during 1938. During the latter year 285 villages were surveyed and a large amount of field and laboratory findings has been collected. The survey is expected to be completed in 1939 and when the material is analysed and studied, the report on these surveys should provide a fund of information regarding the malaria situation in Bengal, on which future health policy in regard to this disease can be based.

The provincial grant for the distribution of quinine was Rs. 1,40,000 in 1936-37. It was raised to Rs. 2,00,000 in 1937-38 and again to Rs. 4,00,000 during 1938-39. The basis of distribution of grants to district boards was partly the ratio of the income of each board spent on quinine distribution and partly the ratio of the malaria patients treated in the district to the total malaria patients in the province during the preceding year. In 1938, for the first time, plasmochin worth Rs. 50,000 was made available to Civil Surgeons for use in the medical institutions under their charge and detailed instructions were issued for the combined use of quinine and plasmochin in the treatment of patients.

The menace to the health of Calcutta and its suburbs by the breeding of the salt water species of mosquito, *A. ludlowii* (*A. sundaicus*) received considerable attention during 1938. Breeding places of this mosquito exist in Wards No. 18, 21, 28, 29 and 31 of Calcutta city, some of them being highly populated parts of the town. Certain areas in Ward 21 were shown to have been newly invaded by this mosquito during the year.

In addition there was extensive breeding of the mosquito in the villages bordering the Salt Lake area as well as in a widely distributed area along the banks of rivers. In regard to the latter Canning, Hasnabad, Bhangore, Kulti, Baruipur, Sankrail, Akra, Barrackpore, Magrahat, Hotar and Diamond Harbour may be mentioned in order to indicate the distribution of the breeding grounds of this mosquito.

In Calcutta city it is reported that control measures were carried out throughout the year by the Corporation staff on anti-mosquito duty. In the Salt Lake area the operations were under the charge of the provincial Public Health Department, the scheme being financed partly by the Calcutta Corporation and partly by the District Board of 24-Parganas. It is stated that the density of the larvae of this species has been appreciably reduced and that the spleen rates in the villages in that area remained, with a few exceptions, below 10 per cent during the year. No epidemic of malaria took place.

In the river side areas, at Budge Budge, control measures were in operation throughout the year under the supervision of the provincial Public Health Department, financial support being derived from the municipality, the mill authorities and the District Board of 24-Parganas. It is stated that the area remained free from *A. ludlowii* and from malaria throughout the year. In other places the authorities of the Bengal-Nagpur, Eastern Bengal, East Indian and Kalighat-Falta Railways took active steps for controlling the breeding

of this mosquito in their respective areas. It is also stated that many municipalities and other bodies also carried out some control work, although inadequate, in accordance with the instructions issued by the Public Health Department.

In the Central Provinces the number of deaths registered under malaria rose from 267,588 in 1937 to 302,250 in 1938, an increase of 34,662. The rural death rate from malaria was 20·9 and urban 16·9. The large rainfall in September and October, giving an excess over the average figure for the previous 70 years to the extent of nine to 47 per cent in different parts of the province, is stated to have been particularly favourable for the epidemic prevalence of malaria. Among the districts, Bilaspur (27,874) reported the largest number of deaths from this cause and Nagpur (14,377) the lowest.

The curve of malaria mortality in Bombay Presidency shows that there is a progressive fall from January to May, which records the lowest figure, and then a steady rise till December when the maximum mortality from this disease is reached. During 1938, malaria deaths numbered 29,790 as against 25,373 in 1937. Bombay city recorded 99 deaths from this disease in 1938. High rates were recorded in the towns of Poona (4·2), Nasik (3·5), Malegaon (3·4), Igatpuri (2·1), Poona Suburban (2·0), Ilkal (1·3), Karwar (1·3) and Hubli (1·1) and in the rural areas in the districts of Nasik (8·4), Poona (3·9), Thana (2·7), Kanara (2·5), Ahmednagar (2·0), Belgaum (1·8) and Dharwar (1·6).

For anti-malarial measures 50 subordinate medical officers were appointed for duty in the most malarious parts of the province. These officers were allotted areas beyond a radius of five miles around each dispensary, the doctor in charge of the dispensary being responsible for the area with the five-mile range. For the special staff of fifty officers Taluka officers were asked to draw up their tour programmes and to suggest modifications, as and when required by local conditions. Each medical officer visited every village within his range once a fortnight. The work of these officers was supervised by the Assistant Directors of Public Health.

An investigation into the incidence of malaria in Pandharpur town was started by the municipality and it continued throughout 1938. Suggestions are being considered for making rules relating to the control of tank irrigation and farming in and around the town, for filling low-lying areas, for a drainage scheme and for the maintenance of an anti-malaria staff.

The Government of Bombay first sanctioned a grant of Rs. 68,730 for the distribution of quinine and later increased the amount to Rs. 71,730. The agencies for the free distribution of quinine included the officials of the Revenue and other departments, school authorities and the public health staff.

In Sind it is stated that the incidence of malaria has increased with the inauguration of the Lloyd Barrage and Canal Construction scheme. It is stated that, while no record of the total incidence of malaria is available, the numbers of patients treated in the urban and rural medical institutions indicate that the prevalence of the disease in the province is extensive. The Director of Public Health reports that a proposal has been submitted to the Government for the appointment of a malariologist and suitable subordinate staff for the province and that the proposal will receive favourable consideration as soon as the finances permit.

The number of deaths recorded under malaria in Sind during 1938 was 1,686 as against 1,514 in 1937. The urban and rural death rates from this cause in 1938 were 1·8 and 0·14 respectively. Among urban areas high rates

were reported from the towns of Ghotki (12·4), Rohri (6·5), Larkana (5·9), Shikarpur (5·4) and Tatta (4·4). The lowest rate was recorded in Karachi (0·08). In rural areas, the districts of Karachi (0·23) and Dadu (0·19) recorded high malaria death rates and Thar Parkar (0·07) showed the lowest rate.

Karachi municipality maintains a fairly large anti-malaria staff and Hyderabad a relatively smaller staff. In these two towns continuous anti-malaria operations were carried out. In some other towns also, preventive measures such as oiling and filling of pits were carried out.

During the malaria season eight touring medical officers were sent out to tour in the rural areas, especially in those parts in which medical aid is not available. Besides treatment of patients, these officers carried out spleen surveys of children, mapped out mosquito breeding places, collected mosquitoes for identification, sent blood smears for examination at the headquarters and advised the people regarding preventive measures against malaria and the value of quinine in its treatment. They visited in all 273 villages. In addition anti-malaria work was also carried out by the doctors in charge of Government travelling dispensaries.

Other measures taken by the Government included the manufacture and sale of cheap mosquito nets, the distribution of leaflets illustrating personal preventive measures against malaria and the value of quinine against the disease, and large scale distribution of the drug. For this distribution the services of officers of the Public Health, Revenue and Educational Departments, administrative officers of District School Boards, voluntary organisations and zemindars employing large forces of labour have been utilised. A sum of Rs. 33,000 was sanctioned for the distribution of quinine during 1938-39. Government also authorised the Director of Public Health to incur expenditure up to Rs. 1,000 per annum on the free supply of magnesium sulphate along with the quinine tablets.

Another useful measure taken by the Government of Sind has been the maintenance of a hatchery for the supply of larvivorous fish (*Gambusia*).

Heads of Government Departments, local authorities and private institutions were advised to give the spraying of residential quarters with Pyrocide 20 a thorough and systematic trial. It is reported by the Director of Public Health that the replies so far received indicate the effectiveness of spraying in reducing the prevalence of mosquitoes and malaria.

The anti-malarial measures in Madras Presidency included (1) the continuation of the work already in progress at Krishnadevipeta in Vizagapatam Agency, the purpose being that of collecting adequate information for formulating a general scheme for the Agency as a whole ; (2) a limited scheme of anti-malarial works in connection with the Papanasam hydro-electric project ; (3) control measures in Hospet municipality, whose results are reported to be satisfactory ; (4) the maintenance of certain anti-malarial works carried out from the Government of India grant for rural development in 1935-36 in Ramnad (Rameswaram), Nellore and Chingleput districts and (5) three investigations organized at Pattukkottai, Wynaad and Ennore financed partly by the provincial Government and partly by a Government of India grant through the Indian Research Fund Association.

At Pattukkottai, where irrigation malaria is the problem, *A. culicifacies* is the chief carrier and irrigation channels, burrow pits and wells form its main breeding places. The fixing of water-tight calco gates for the irrigation channels has been started, most of the burrow pits have been drained by the Public

Works Department and orders have been issued for the prevention of the formation of such burrow pits in future, the badly aligned field channels in a demonstration area have been properly realigned in order to secure the co-operation of the agriculturists and a central larvicidal fish nursery is being maintained for distributing *Gambusia* in wells.

In the Wynaad, *A. fluviatilis* appears to be the sole carrier, the breeding places being the drains in the rice fields and hill streams. The planting of certain species of trees for providing shade over the water channels has been started on an experimental scale and herbage packing has also been tried in Sultan's Battery and Kalpatta.

In Ennore, where *A. culicifacies* breeds in casuarina pits, certain difficulties were experienced when control of breeding was attempted through the distribution of *Gambusia* and further investigations are in progress for developing other lines of attack.

A rapid malaria survey was carried out during the year in the Shevaroys (Salem district) and while a detailed investigation by a special unit was considered essential for the introduction of systematic control measures, an extension of the scheme for the free distribution of quinine to this area was recommended provided the local authority undertook to provide the necessary staff for supervision.

A scheme of permanent anti-malarial measures for Uttangarai (Salem district) was discussed at a conference of the officers of the Revenue, Public Health, Public Works and Local Board Departments and the scheme was submitted to Government for sanction.

The scheme for the free distribution of quinine operated in nearly 1,500 villages during 1938 in the coastal area of Vizagapatam district and in parts of Nellore and Anantapur districts, which suffered from severe epidemics of malaria during the year. About 1,800 pounds of quinine were distributed. Quinine was also sold at a reduced price. It is stated that, although a wide distribution of the drug was attempted through new agencies such as village headmen and teachers of schools maintained by the Government and local bodies, the value of quinine in the campaign against malaria has not yet been fully appreciated by the people and that more propaganda is needed to make its use more popular.

The amounts of quinine and other cinchona products distributed free and sold in the provinces during 1938 are shown in the table below. Both for rural and for urban areas Bengal is well ahead of all other provinces, its total amount (62,135 pounds) being many times greater than that of the next province, Madras (9,795).

Table II (e).

Distribution of Quinine, Cinchona Febrifuge, Totaquina and other Cinchona Alkaloids during 1926.

	Rural areas.										Urban areas.									
	Distributed free.				Sold.				Total.		Distributed free.				Sold.				Total.	
	Quinine.	Cinchona febrifuge.	Totaquina.	Other cinchona alkaloids.	Quinine.	Cinchona febrifuge.	Totaquina.	Other cinchona alkaloids.	Quinine.	Cinchona febrifuge.	Totaquina.	Other cinchona alkaloids.	Total columns (9)-(12).	Quinine.	Cinchona febrifuge.	Totaquina.	Other cinchona alkaloids.	Quinine.	Cinchona febrifuge.	Totaquina.	Other cinchona alkaloids.	Total columns (13)-(16).
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
British India	20,837	17,337	1,104	639	21,644	373	238	..	42,481	17,801	1,402	638	61,181	8,224	4,191	256	737	7,591	624	2,473	114	13,609	4,905	2,628	344	21,486
N.-W. F. P.	730	762	1	..	..	..	..	..	730	762	1	..	1,493	280	273	..	..	..	..	..	..	280	273	..	..	553
Punjab	..	..	..	..	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	707*	1	708
Delhi	22	10	..	..	..	..	..	..	22	10	..	..	32	194	88	..	..	..	..	..	..	194	98	..	..	292
C. P.	3,550	5,588	..	..	941	..	..	..	4,491	5,588	..	..	10,079	1,236	1,070	..	3	..	..	..	..	1,236	1,070	..	..	2,309
Bihar	3,212	..	..	..	..	..	..	..	3,212	..	..	..	3,212	..	..	..	..	..	..	..	..	..	..	..	..	..
Orissa	783	465	52	14	351	..	..	..	1,134	465	52	14	1,665	271	72	..	64	..	..	..	..	271	72	..	..	407
Bengal	13,073	10,415	336	576	17,560	7	..	..	30,633	10,424	336	576	42,865	3,966	1,801	179	126	3,764	225	..	111	8,822	2,082	189	237	13,470
C. P.	1,018	319	45	52	948	26	..	7	1,966	345	45	59	2,415	522	443	41	160	944	39	..	1	1,797	528	41	94	2,461
Bombay†	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sind	2,001	239	15	23	205	..	..	..	2,210	239	15	23	2,487	162	55	1	1	..	..	..	..	162	55	1	1	219
Madras	1,511	127	748	..	1,598	..	19	221	3,107	218	979	..	4,304	65	14	195	3	2,186	413	3,471	2	2,054	426	2,378	5	4,863
Coorg	731	264	77	11	28	..	..	..	759	264	77	11	1,111	82	165	73	..	..	..	..	..	82	165	73	..	320
Assam	3,045	619	*	*	176	329	..	..	3,221	1,048	*	*	4,271	856	134	6	1	36	121	..	..	856	286	6	1	1,149
Ajmer-Merwara	46	2	..	..	3	..	..	..	49	2	..	..	51	84	74	..	..	..	..	..	..	84	74	..	..	158

* Less than half pound.

† Quinine worth Rs. 6-15-0 only was sold to the villagers.

‡ Details according to rural and urban areas not available.

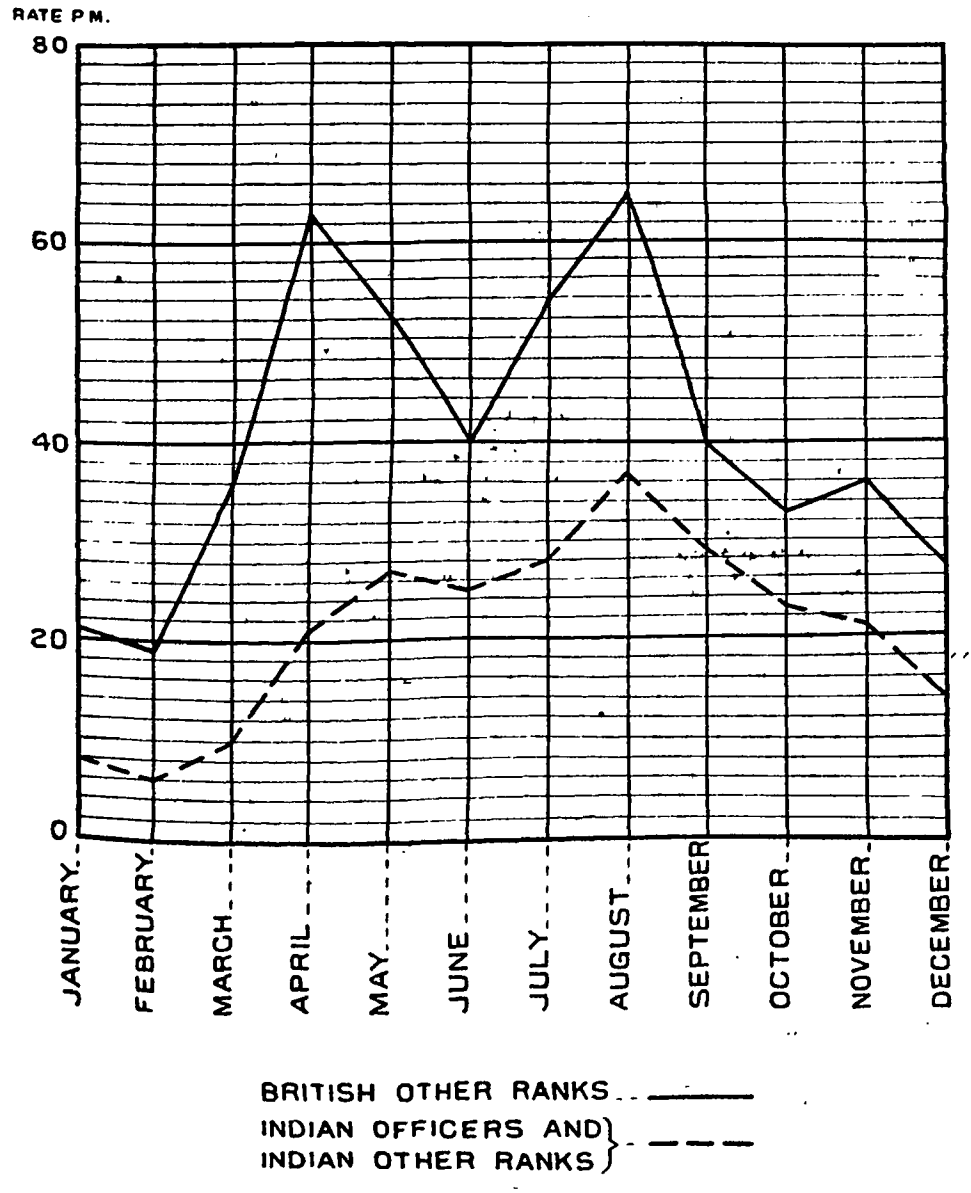
§ Including 273 lbs. distributed free in tribal area.

* Including 114 lbs. distributed free in tribal area.

Total.

d.						Total.
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Tota-quina.	Other cinchona alkaloids.	Quinine.	Cinchona febrifuge.	Tota-quina.	Other cinchona alkaloids.	Total columns 36-39
34	35	36	37	38	39	40
2,711	116	83,984	23,938	4,264	1,182	113,368
..	..	1,373	769	1	..	2,143
..	..	2,302	407	..	..	2,709
..	..	217	108	..	..	325
..	..	5,164	3,608	..	..	8,772
..	..	3,665	..	..	..	3,665
..	..	1,425	565	55	14	2,059
..	111	46,461	14,507	354	813	62,135
7	1	3,802	899	93	119	4,913
..	2	6,265	448	33	179	6,925
..	..	2,672	184	13	40	2,909
2,704	2	5,591	642	3,557	5	9,795
..	..	842	390	152	11	1,395
..	..	4,111	1,334	6	1	5,452
..	..	94	77	..	..	171

MEAN MONTHLY DEATH RATES PER MILLE FROM DYSENTERY AND DIARRHOEA AMONGST BRITISH OTHER RANKS AND INDIAN OFFICERS AND INDIAN OTHER RANKS DURING 1932-1938



Dysentery and Diarrhœa.

19. The number of deaths recorded as due to dysentery and diarrhœa in 1938 was 292,482 giving a rate of 1·1 *per mille* of the population compared with 1·0 for the previous year. The rates for urban and rural areas in 1938 were 2·4 and 0·9 respectively.

The monthly distribution of deaths from dysentery and diarrhœa shows that the incidence of these diseases was highest during the months of July, August and September. The vital statistics for the civilian population in India lack accuracy in many directions, including the recorded date of occurrence of death. In attempting, therefore, to study the seasonal incidence of dysentery and diarrhœa it is desirable to make use of more reliable figures. The graphs facing this page are based on figures kindly supplied by the Medical Directorate, Army Headquarters, India. These graphs show the rates *per mille* of average strength of the case incidence from dysentery and diarrhœa among the British and Indian troops of the Army in India. It will be seen that, in each case, there are two peaks, one in April-May and the other in August. February is the period of lowest incidence while the incidence of these diseases is high during March to September. In a recent study* of the seasonal incidence of dysentery in the Army in India during 1933-38, it was pointed out that, as fly breeding largely influences the incidence of the disease, "the presence of appropriate warmth and moisture is the decisive factor in the seasonal prevalence of dysentery". For the country as a whole the warm moist months, July to September, are the most favourable for the spread of the disease and the period, November to February, the least favourable. Since the Army is distributed all over the country it is reasonable to assume that the seasonal incidence of dysentery among the troops represents its seasonal incidence among the civil population also.

Provincial rates for deaths from dysentery and diarrhœa, which are given in Table K of Appendix II, vary considerably from 2·6 *per mille* in the Central Provinces to 0·1 in Bihar. It is difficult to say how far these differences are due to inaccuracy in the recording of deaths under these causes and how far they are due to actual differences between the provinces regarding the incidence of these diseases.

Respiratory Diseases.

20. The number of deaths from respiratory diseases in British India during 1938 was 536,649 as against 487,319 in 1937. There was thus an appreciable increase in the recorded deaths under this group, the corresponding rates *per mille* being 1·9 and 1·8 respectively. Provincial death rates from respiratory causes are shown in Table M of Appendix II classified into the two sexes and into rural and urban areas. The urban rate (6·3) is more than four times that of the rural areas (1·5). The mortality rate of males (2·1) is higher than that of females (1·7).

Among the provinces Delhi and Bombay recorded the high rates of 8·1 and 6·4 respectively while Bihar had the lowest figure of 0·1. There is no doubt that the vagaries of the existing machinery for the registration of the causes of death are largely responsible for such wide differences in the provincial rates. The urban rate in every province is higher than the rural rate, although

*"The seasonal incidence of dysentery in India amongst Military Personnel" by Lt.-Col. T. O. Thompson, R.A.M.C. and Lt.-Col. C. D. M. Buckley, M.C., R.A.M.C., Journal of the Royal Army Medical Corps, December 1939.

the ridiculously large differences between the two rates in certain areas (0·02 and 14·7 and 0·9 and 12·0 in Ajmer-Merwara and Coorg for rural and urban areas respectively) must be largely due to defective registration. Nevertheless, it is safe to assume that respiratory diseases take a higher toll of lives in the towns and cities than in the villages. The prevalence of more overcrowding and ill-ventilation in urban than in rural areas mostly accounts for the higher mortality from this group of causes.

The monthly distribution of deaths from respiratory diseases is shown in Table N. In British India as a whole and in the provinces the largest numbers of deaths were recorded in December and January while the warm summer months showed a reduction in mortality from these causes.

Tuberculosis.

21. While no accurate figures are available regarding the incidence of tuberculosis in the country, the available evidence seems to suggest, as pointed out in previous reports that the disease has been spreading from the more congested urban to the rural areas and now constitutes one of the most important problems in India from the point of view of the public health. Like leprosy it is one of those social diseases whose control can be attempted only by a comprehensive plan of improvement of living conditions. While medical measures are undoubtedly essential for tracking down infection and for affording relief to the patient as well as for preventing the spread of infection, social measures directed towards improved housing conditions and better nutrition constitute an equally important part of the preventive campaign. Education of the people in regard to the mode of spread of the disease and the methods of personal prophylaxis against infection are also necessary in order to secure their intelligent cooperation in the fight against tuberculosis.

In India, with its relatively primitive health organisations for most parts of the country, it is difficult to attempt to provide the highly specialised tuberculosis services which more advanced countries possess. For the larger cities and towns, with their congested populations and better financial resources, special organisations will no doubt be built up in course of time for combating the disease. It is the vast rural population scattered over wide areas that presents the most difficult problem. A gradual extension of rural medical service must precede any attempt to provide a specialised tuberculosis service. When an adequate rural practitioner service has been brought into being, it may be possible to provide tuberculosis organisations on a regional basis so as to include a number of villages in each group, the rural dispensary doctors being made the instruments through which the special knowledge of the expert at headquarters is made available to the villagers. The specialist can visit each village at stated intervals, examine all the suspected and recognised cases of tuberculosis and the medical advice given by him will then be followed under the direction of the local doctor during the intervals between such visits. As the educational campaign in the home is a very important part of the programme, a staff of tuberculosis health visitors constitutes an essential link in the chain of preventive measures and provision must be made for their inclusion in the scheme. In some such way as has been indicated above it should be possible to provide a tuberculosis service for the rural areas, which combines preventive work with that of affording immediate relief to the patients.

The work of the existing organisation for combating tuberculosis has been summarised on pages 240 and 241 of the 1937 report. It is therefore sufficient to summarise briefly here the work in the provinces during 1938.

In the N.-W. F. Province a tuberculosis sanatorium at Dadar was under construction during the year under review and was opened to the public in May 1939. The total cost of the institution is stated to be Rs. two lakhs and it provides 70 beds for patients. The appeal for funds for anti-tuberculosis work issued by the Marchioness of Linlithgow in December 1937 and the wide response it produced in the province have helped to bring home to the authorities and the people that the disease constitutes an increasing menace to the public health. The Director of Public Health states that the statistics relating to the recruitment of the Police and Army indicate that the incidence of the disease is increasing.

It is reported that, in the Punjab, no expansion of anti-tuberculosis work took place in 1938 and the reason is stated to be that local bodies desired to postpone an expansion of their programmes of work until a provincial Tuberculosis Association had been started and a definite policy for the province had been formulated.

Tuberculosis is notifiable in all the towns of the Punjab, while in the rural areas, its notification is not compulsory. Although medical practitioners generally hesitate to notify cases of tuberculosis it is stated that some slight improvement has taken place in recent years.

Anti-tuberculosis institutions were maintained in four towns in the province and the Government paid its usual yearly grants of Rs. 7,500 and Rs. 5,000 to the Dharampur and Samli Sanatoria.

The Chief Health Officer, Delhi Province, in his annual report has discussed the tuberculosis problem in his area. While registered mortality figures for this disease must be considered to be an underestimate of the actual events, the fact that 1,057 deaths were attributed to tuberculosis in 1938 indicates, he states, that there exist at least 10,000 active cases of the disease disseminating the infection in the urban and rural areas of the province. The results of a survey covering 3,743 cases attending the Delhi Tuberculosis clinic during a period of 18 months since its establishment in 1936 throw further light on the tuberculosis problem. Of the total number of 3,743 patients pulmonary cases were 3,227 and non-pulmonary 516. Discussing the question of institutional treatment and the isolation of patients from the point of view of controlling the spread of infection, he points out that the early afebrile and febrile cases requiring sanatorium treatment numbered 1,161, the advanced febrile cases for admission to hospital 1,486 and the hopeless cases 580. On the assumption that, under Indian conditions, an average stay of four months in an institution is necessary for each patient, he points out that 716 beds would be necessary in order to provide for the patients in all the different categories. The number available at the Silver Jubilee Tuberculosis Hospital is 90 and when the proposed extension takes place, it will rise to 114 beds. When it is remembered that the figures provided by the survey represent only a fraction of the total incidence of tuberculosis in the province, the disparity between the required number of beds and those now available becomes even more striking. A much wider extension of institutional treatment as a part of the preventive campaign is therefore not practicable. The organisation of a domiciliary service directed towards the utilisation of the available facilities in the homes of the patients and particularly towards the protection of the children exposed to infection appears to be the best possible method of developing preventive work.

The Chief Health Officer also lays stress on the part played by overcrowding and insanitary home conditions in the spread of tuberculosis and states that, without slum clearance, " all others fall into insignificance, if not complete uselessness ". In this connection it is satisfactory to record that the

Delhi Improvement Trust is taking active steps to remove the slums and to provide a scheme whereby sanitary dwellings will be made available to the poorer sections of the community within their means.

The desirability of providing for the daily distribution of milk to school children is also emphasised. The success of a scheme in operation in New Delhi should stimulate the other local bodies in the province to adopt a similar measure to improve the physical efficiency of the schoolgoing population.

In Bihar active anti-tuberculosis work is stated to have started in 1936 when a provincial branch of the King George Thanksgiving Anti-Tuberculosis Fund was established. A local committee has been formed in each of the 16 district headquarters with the District Magistrate as President and generally the Civil Surgeon as the Secretary. Clinics have been opened and are stated to be functioning actively in 12 district headquarters towns and it is expected that similar clinics will be opened in the remaining towns also in the near future. The district committee has the administrative control of the clinic, which is situated in a separate building of its own in the compound of the Sadar Hospital provided by the provincial headquarters. Each clinic has a medical officer who has had special training in tuberculosis and it is also proposed to provide a male and a female health visitor at the clinic.

Provision for institutional treatment is proposed to be made by the construction of 50-bedded cheap sanatoria for each district. The structures are of a semi-permanent nature and are expected to last about 10 years. The estimated cost, including equipment, is Rs. 27,500. The cost of maintenance of these institutions is stated to be Rs. 11,000 a year and it is expected that three-fourths of this amount will be realised from paying patients for whom about 20—23 beds will be allotted in each sanatorium. The construction of an inexpensive sanatorium of this kind is about to be started in Patna in order that it may serve as a model to other districts.

The problem of isolating infectious cases cannot be solved, except at a prohibitive cost, by the provision of hospital accommodation. It is therefore essential to develop a system of domiciliary treatment for the majority of the patients attending the tuberculosis clinics. The clinic is proposing to provide each patient, free of cost, a spittoon and a face mask in order to reduce the chances of infection to other members of the family. It has also been suggested that, in order to promote the consumption of milk by patients, the keeping of goats should be encouraged.

Other activities included intensive propaganda and the training of doctors in anti-tuberculosis work at the special course for medical graduates at Calcutta under the auspices of the King George Thanksgiving Anti-Tuberculosis Fund.

The report of the Director of Public Health, Bengal, mentions that schemes for two surveys have been submitted to the provincial Government for sanction. One of them is to be carried out in a mixed rural and urban population and the other in an industrial population. The surveys are intended to collect accurate information regarding the incidence of tuberculosis among the different sections of the population and at different age periods and to study the various factors associated with the prevalence of the disease. Further, a detailed scheme for the control of tuberculosis in the province has also been submitted to Government.

The activities of the Bengal Tuberculosis Association were summarised in the annual report for 1936. This Association has five dispensaries in Calcutta, one in Howrah and four in other parts of the province. In addition to these activities the Senior Medical Officer of the Association visited a number

of places in the province and discussed with the local authorities the tuberculosis problem and the possibility of developing anti-tuberculosis work. A course for the training of tuberculosis health visitors was arranged during the year. The course lasted six months and, of the 31 students attending the course, 22 were successful in the examination held at the end of it. In addition the Association gave training to eight students of the Sir John Anderson Health School in anti-tuberculosis work.

The number of beds available at Jadabpur Tuberculosis Hospital was extended by 20 during the year, besides the provision of temporary accommodation for 10 male patients. In addition quarters for the nurses were built for which the Calcutta Corporation made a grant of Rs. 25,000. The Corporation also sanctioned a grant of Rs. 50,000 to the hospital through the King Emperor's Anti-Tuberculosis Fund, the proceeds of which will be utilised for the provision of an additional 150 beds.

In the Central Provinces four new tuberculosis clinics were established during 1938 at Nagpur, Jubbulpore, Amraoti and Raipur and 5,277 patients were treated at these clinics. At the tuberculosis sanatorium at Pendra in Bilaspur district, the number of patients at the beginning of the year was 93 and 168 were admitted during the course of year, thus making a total of 261. Of these it is reported that five died, 52 were discharged as cured, 27 as partially cured and 32 as showing no response to treatment while 34 left as they were non-tuberculous cases, leaving 111 patients at the end of the year.

Tuberculosis clinics have been opened by the Bombay Government in Ahmedabad, Surat, Poona, Nasik, Sholapur and Belgaum Civil Hospitals. In addition there are private sanatoria for the treatment of the disease in a few towns. Panchgani and Nasik municipalities have resolved to adopt bye-laws for the confidential notification of cases of tuberculosis in their areas.

In Sind the Karachi Corporation and Hyderabad Municipality maintain tuberculosis dispensaries and it is reported that good work was done by these institutions.

Hookworm Disease.

22. The distribution of hookworm infection in India was briefly described in last year's report. As the main cause of the infestation is the indiscriminate pollution by nightsoil of the inhabited areas in towns and villages, the value of an organised campaign against this disease in raising the general standard of the health of the people by eradicating not only hookworm disease but also other bowel diseases cannot be over-emphasised. In fact the organisation of a popular system of nightsoil conservancy for the rural population is one of the most urgent health problems in this country. In all those areas in which hookworm disease is prevalent, a campaign based on mass treatment, the provision of latrines and education of the people to make use of them can become a successful method of convincing the population of the value of preventive health work. Work on these lines has been in progress in the province of Madras for some years. In the Punjab too a considerable amount of anti-hookworm work has been done since 1934 but the provision of bore-hole latrines was tried only in one area and there the experiment met with little success. Efforts have therefore been concentrated on keeping village sites clean by encouraging the people to dispose of their filth by trenching it in a place well away from the inhabited area.

In Madras it is reported that the anti-hookworm campaign carried out in 1938 included examination of 9,567 specimens of stools, 197,895 treatments and intensive propaganda by the exhibition of cinema films on hookworm,

lectures with magic lantern demonstrations or charts and the distribution of leaflets. As was pointed out in last year's report, there are six rural sanitation units, each consisting of a trained medical man and assistants, maintained by the Public Health Department, their work being coordinated by a Special Health Officer in the office of the Director of Public Health. These units are lent to the different district boards in the province for work in their respective areas. One of their important functions is that of stimulating the construction of bore-hole and trench latrines in the rural areas and of encouraging the people to make regular use of them. It is stated that the local bodies in the districts are taking an increasing interest in this rural sanitation work. In many districts squatting slabs for bore-hole latrines in private houses are supplied by local authorities at half cost or at concession rates. It is stated that, for the province as a whole, the local bodies spent on rural sanitation Rs. 1,32,342 and that in one district alone a sum of Rs. 14,795 was spent during the year under review. A number of public latrines had been constructed in 1935-36 and 1936-37 out of grants from the Government of India for rural development and it is stated that they were maintained, in most districts in good condition by the local bodies concerned.

In the Punjab it is reported that surveys carried out in different districts since 1934 have shown that the disease is widely prevalent. The percentages of infested persons in the districts vary from 4·1 per cent in Hissar to 87·5 per cent in Jullundur. Antihookworm activities increased considerably in 1938, the number of units for mass treatment being increased from four to eight. In 1938 the total number of persons treated was 87,863 as against 49,423 in 1937. Since the beginning of the campaign against the disease 350,933 persons have undergone treatment. It is reported that tetrachlorethylene has proved to be a safe and effective remedy.

In the Central Provinces examination for hookworm disease was stated to have been carried out in 1938 in six jails and a total of 113 cases was discovered. They underwent treatment and 109 are stated to have been cured.

Leprosy.

23. The geographical distribution of leprosy in India and the work of the organisations, official and voluntary, engaged in leprosy relief work have been briefly described in previous annual reports. Short reviews of the work carried out during 1938 by the Indian Council of the British Empire Leprosy Relief Association and by the Mission to Lepers, the most important voluntary organisation engaged in antileprosy work, are given on pages 181—183 of this report. The campaign against the disease has been carried on, as in previous years, by the establishment of treatment clinics by surveys of leprosy incidence in limited areas, by field and laboratory research into the problems associated with the incidence of the disease, by the training of medical men in modern methods of diagnosis and treatment and by propaganda among the people.

The work so far carried out has brought out certain salient facts. Leprosy, though an infectious disease, is not easily transmitted from person to person and appears to require prolonged periods of contact for the transference of infection. Childhood is the most susceptible age period and any preventive campaign, if it is to be successful, should lay particular emphasis on the protection of children from infection. No specific treatment has yet been discovered for leprosy, although a considerable amount of research has been carried out in the past, and while treatment has undoubtedly its place in the antileprosy campaign, the available methods do not appear to hold out the hope that the many thousands of infectious lepers in the country can be rendered innouous by treatment alone.

In its social aspects the disease presents certain problems. While the decrepit and disfigured leper beggar in the street spontaneously causes a feeling of revulsion in the mind of the onlooker, Hindu religious practice encourages the giving of alms to these people and thus promotes their congregation in large numbers in festival centres all over the country. In some of the larger cities begging in the streets has become an organised and remunerative profession for lepers and a thriving population of these people, many of whom are infectious, exists in such places, their numbers being reinforced by arrivals from the rural areas. Although it is true that, because these leper beggars live segregated from the general population of these cities, the danger of infection to the public is small, the propagation of children by these lepers and their continuous exposure to infection during the early ages of life lead to a steady increase in the leper population. Moreover some measure of commingling of lepers with the lower sections of the uninfected community cannot be avoided and this also contributes its share to the spread of the disease. The presence of these social factors emphasises the necessity for a wide programme of education as an essential part of the campaign against the disease. Until the people begin to realise that their fullest cooperation for carrying out the necessary preventive measures can alone secure a reasonable measure of success in the fight against leprosy, governmental and voluntary efforts, however well organised they may be, must largely fail to produce results.

The fact that at least a quarter of the estimated population of a million lepers in India are considered to be in the infectious state and that the incidence of the disease is higher in the rural than in urban areas renders the control of leprosy extremely difficult. Segregation of the infectious cases will undoubtedly have to play an important part in the campaign before the spread of the disease can be arrested. Lack of funds, popular sentiment and administrative difficulties stand in the way of making any rapid progress. Cheap methods suited to Indian rural conditions, coupled with intensive efforts to win the cooperation of the people, can alone achieve success. As has been pointed out by the Inspector General of Civil Hospitals in Bihar *, "In the present financial circumstances of India provision for lepers can be best achieved by leper colonies in cheap huts, directed by competent social workers and medical officers. These leper colonies become largely self-contained and self-supporting . Such leper colonies in inexpensive huts are indeed the only practical method of attempting to deal with the large numbers of lepers involved. Large expensive modern hospitals for lepers are neither essential nor desirable. The funds available should be devoted to the extension of cheap leper clinics run by keen whole-time workers and social workers, to the provision of cheap colonies, to increased propaganda, to leper surveys and research work, especially on more efficient methods of treatment. Such lines should provide our unceasing present aim".

Antileprosy work in the provinces during 1938 may now be briefly summarised.

In the Punjab it is reported that leprosy surveys were carried out in 1938 in Ludhiana, Hissar and Gurgaon districts and in the Nurpur and Seraj tahsils of Kangra district. Of 3,101 villages surveyed lepers were found in 237 and the total number of cases detected was only 456. Of these 250 are reported to be non-infectious and 206 infectious. The surveys carried out

* "Notes on leprosy in Bihar with suggestions for the future development of Bihar Leprosy Relief Association" by Colonel H. Stott, I.M.S., Inspector General of Civil Hospitals, Bihar, and Secretary, Bihar Leprosy Relief Committee.

since 1931 have covered 20 districts and 10,046 villages in these districts. Lepers were discovered only in 1,126 villages and the total number of cases was 2,459. It is clear that leprosy does not constitute such an important health problem in the Punjab as it does in some other parts of India.

Nineteen new clinics were opened during 1938 by the Government and local bodies, the total number in the province at the end of the year being 124.

Thirty medical men and 21 nurses from the areas surveyed were given special training in leprosy during the year. The numbers of medical men and health personnel trained in leprosy in the province by the end of 1938 were two health officers, 294 doctors, three sanitary inspectors and 24 nurses.

The Leprosy Officer, in addition to giving the special training mentioned above, delivered lectures and gave demonstrations on leprosy to the final year medical students and post-graduate classes at the King Edward Medical College, Lahore, the Medical School, Amritsar, and the Women's Christian Medical College, Ludhiana. He also inspected the leper homes in various parts of the province.

In Bihar antileprosy treatment for in-patients in special institutions is carried out (1) at five Mission Asylums situated at Purulia, Bhagalpur, Muzaffarpur, Gaya and Saldaha, and (2) at three institutions under the management of local committees, which are maintained by public subscriptions and by grants from the Government and local bodies. These three institutions are at Deoghar, Purulia and at Dhanbad. In addition it is reported that there were in 1938, 44 outdoor leper clinics against 41 in 1937. At these clinics 9,598 patients were treated during the year under report as compared with 17,967 in the previous year.

The Purulia Leper Home and Asylum is reported to have made some progress in its activities during the year, the outstanding feature being a large increase in the number of children who came under treatment. Increase of hospital accommodation for leper patients included the addition of a ward at the Saldaha institution and the preparation of plans for the conversion of a bungalow at the Bhagalpur leper institution into a well-equipped treatment centre with facilities for laboratory work and an operation theatre.

During the year two sub-assistant surgeons were deputed for training in leprosy at the Calcutta School of Tropical Medicine. As usual a course of lectures on leprosy was delivered to the students of the Prince Edward Medical College, Patna, by the medical officer in charge of the Gait Skin Clinic, Gulzarbagh. Lectures were also given to the senior students of the Darbhanga Medical School.

The Director of Public Health, Bengal, states that, although leprosy is prevalent throughout the province, its incidence is particularly high in the districts of Rangpur, Midnapore, Murshidabad, Birbhum, Nadia, Rajshahi, Bankura, Dinajpur, Dacca, Hooghly, Mymensingh and Burdwan. The campaign against the disease has hitherto been mainly directed by the local bodies, which provided treatment clinics according to their financial resources. The question of isolation of infectious cases had not so far been considered at all. In order to meet the situation, therefore, the Director of Public Health has, it is reported, drawn up a comprehensive scheme which has been approved by the provincial government. This scheme provides for suitable grants to the local bodies of those districts in which the prevalence of the disease is high. Arrangements have also been made with the British Empire Leprosy Relief Association for carrying out leprosy surveys in the affected areas.

Leprosy is reported to be widely prevalent in the Central Provinces, the areas most affected being the districts of Bilaspur, Raipur, Drug, Chanda, Wardha, Chhindwara, Amraoti, Yeotmal, Buldana, Akola and Nimar. During 1938 two more treatment centres for leprosy were established at Bhandara and Arni respectively, thus increasing the total number of centres in the province from 35 to 37. The widespread outbreak of cholera that took place all over the province during the year and the temporary transfer of the medical staff of the leprosy clinics to cholera duty led to a fall in the number of patients treated at these clinics during 1938, the figure being 87,599 compared with 92,201 in the previous year. It is reported that, during the year patients free from the symptoms of leprosy numbered 118 and that an improvement of their conditions was recorded in respect of 1,542 patients. A resurvey of the affected areas resulted in the discovery of 409 new cases and these were brought under treatment. Eleven Assistant Surgeons, 18 Assistant Medical Officers and 16 private practitioners in the province have had special training in leprosy at the Calcutta School of Tropical Medicine. In 1938 the Provincial Leprosy Specialist was sent to Calcutta for training in field investigations and a Sub-assistant Health Officer underwent a refresher course in Chandkhuri.

It is reported that, in Madras Presidency, leprosy surveys were carried out during 1938 in a number of towns and villages in the districts of South Arcot, Chittoor and East Godavari. In a population of about 78,000 in 82 villages in these districts, 1,503 cases of leprosy were detected. It is stated that an intensive survey will probably result in the discovery of an additional 1,000 lepers. During school surveys, of 24,139 pupils examined nearly 400 were definitely cases of infection and 500 suspicious cases.

Approximately 4,000 cases were treated during 1938 in the leper institutions of the province and of these 337 were discharged as " disease arrested ". The Government have ordered that, in future, admission as in-patients to institutions receiving grants-in-aid from provincial funds should be restricted to infectious cases amenable to treatment. The number of outdoor leprosy clinics during the year was 456 and the number of new patients treated was 33,500.

Twentytwo health officers underwent post-graduate training in leprosy during 1938.

In Assam a total of 4,375 lepers received treatment during 1938 in the institutions under the control of the Medical and Public Health departments. The number of centres under the Public Health Department for the treatment of leprosy remained the same as in 1937, namely, 62. Ten medical officers of Public Health Department were given training in leprosy locally. Sub-assistant Surgeons under the Department, who were engaged in kala-azar surveys, also carried out leprosy surveys in their respective areas. Propaganda lectures on leprosy, with the aid of magic lanterns, were carried out by Assistant Surgeons of the Public Health Department.

Leprosy research carried out during 1938 is briefly summarised below :—

A study of leprosy in Burmans and Indians by Dr. Lowe and his co-workers at the Calcutta School of Tropical Medicine showed striking differences in the incidence of the various types of the disease. In Burmans the severe lepromatous type forms about 50 per cent of the total compared with about 25 per cent in Indians. Further, in the Burmans the mild neural form shows a tendency to develop into the severer forms. The mild types are found chiefly in children among the Burmans while, among Indians, they are found in all age groups. The conclusion is drawn that racial immunity to leprosy is lower among the Burmans than among Indians.

A clinical and bacteriological study of about 3,000 cases in Calcutta at different parts of the year during the past two years has shown marked seasonal variations in severity in lesions of the neuro-macular type. From February to September signs of activity and inflammation are more evident than at other times of the year and during February to May, the proportion of lesions showing bacilli in smears rises from a normal of about 6 per cent to over 20 per cent, the proportion again falling suddenly below 5 per cent in June. It is probable that this increased activity of the lesions is due to climatic factors.

The findings of a survey of leprosy incidence in a group of 42 villages in Bengal are of considerable interest. The gross incidence was 4 per cent, of which only 18 per cent are of the severe lepromatous type, a much lower figure than has been found in some other parts of the world. The great majority of infections were contracted in childhood, about a third having been infected by close relations, another third by more distant relatives, and the remaining third by either unknown persons or by persons who were in no way related to the patients. Close contact at the earlier ages produced the severer forms of the disease, lepromatous cases being more infective than the mild neural ones About 80 per cent of the cases of leprosy gave a history of contact. Males showed a higher incidence and greater severity of symptoms than females.

Laboratory studies included (1) the complement fixation test with W. K. K. antigen, it being shown that positive results were obtained in practically all cases of leprosy in which bacilli can be found in smears, (2) cultivation of *M. leprae*, which has so far been unsuccessful and (3) inoculation of human leprosy material on splenectomised Syrian hamsters in order to investigate their susceptibility to leprosy, a claim which has been advanced by Adler but which has not so far been substantiated by the work done in Calcutta.

At the Lady Willingdon Leper Settlement, Chingleput, in Madras Presidency, Dr. Cochrane investigated the influence of skimmed milk on the progress of treatment of leprosy. Although the numbers of cases under observation were small and no definite opinion could therefore be expressed, certain tentative conclusions have been drawn :—

1. administration of skimmed milk (eight ozs. of fluid milk a day) for a period of nine to 18 months did not appear to have any influence on the neural lesions of leprosy, while
2. some slight evidence has been produced to show that, in respect of the lepromatous type, administration of skimmed milk is of value.

Yaws.

24. In last year's report the geographical distribution of yaws in India and its main epidemiological features were briefly reviewed. During 1938 information regarding its prevalence is available with respect to the provinces of Madras, the Central Provinces and Assam. In Madras it is reported that the disease was prevalent in the districts of Madura, Kurnool and Tinnevelly. In Madura the disease was first noticed in a village in July 1937 and 89 cases were treated that year. In September 1938 there was a recrudescence of the infection which lasted till February 1939 and gave rise to 40 cases in all. In Kurnool the disease was confined to an aboriginal tribe and in Tinnevelly the infection was restricted to a single village and there only to fishermen.

In the Central Provinces it is reported that the health staff of three districts Chanda, Bilaspur and Drug discovered 255 cases of yaws, all of whom were brought under treatment.

In Assam, 3,234 cases of this disease were treated in 1938 against 2,607 in 1937. Three more centres for treatment were opened in each of the districts of Goalpara and Nowgong and two medical licentiates were given training in the diagnosis and treatment of yaws.

Kala-azar.

25. The incidence of kala-azar is mainly confined to north-eastern India, in the provinces of Bihar, Bengal and Assam. The United Provinces and Madras also have a certain number of cases every year. In Bihar, Bengal and Assam the prevalence of this disease is reported to have been greater in 1938 than in 1937. The figures given in the following table relate to the cases treated and the deaths taking place in medical institutions in the provinces from kala-azar during 1938. They provide some indication of the degree of its prevalence in individual provinces.

TABLE II (*vi*).

	Cases.	Deaths.
N.-W. F. P.	..	..
Punjab	9	..
Delhi	1	..
U. P	995	9
Bihar	116,568	387
Orissa	66	3
Bengal	107,146	420
C. P.	11	..
Bombay	23	2
Sind	..	..
Madras	2,263	20
Coorg	..	..
Assam	8,775	112
Ajmer-Merwara	..	..

In Bihar, as pointed out in last year's report, there has been a recrudescence of the infection in that area of the province which lies to the north of the Ganges. From the above table it will be seen that Bihar reported the largest number of cases of this disease treated in medical institutions and that the figures for this province and for Bengal are well over a hundred thousand in each case.

Knowledge regarding the exact mode of transmission of infection is still lacking, although intensive researches are in progress in Bihar under the auspices of the Indian Research Fund Association. As treatment of patients with the many varieties of pentavalent preparations of antimony now available on the market results in curing the disease in about 95 per cent of the cases, in all the affected areas the main effort has been concentrated towards providing facilities for treatment. In Bihar it is reported that the Government sanctioned Rs. 6,200 for meeting the expenditure on five treatment centres and deputed five doctors for special training at the Patna Medical College. These centres started functioning early in February 1939. In order to strengthen this campaign of treatment, 15 additional centres in North Bihar have, it is reported, been sanctioned during 1939-40.

In Bengal it is stated that the annual grant of Rs. 1 lakh for the campaign against kala-azar was fully utilised for the purpose during 1938-39. In the districts of Bankura and Birbhum the incidence of the disease was negligible. In Darjeeling district, in view of the stead increase in the spread of infection, a special scheme was put into operation costing about Rs. 17,500. Nineteen special officers were appointed for the campaign and, in addition to the treatment of cases, they also carried out propaganda among the people. Two sanitary inspectors were also deputed for educating the people and inducing the patients to avail themselves of the facilities for treatment that had been provided. In all, 15,816 old and 2,951 new kala-azar cases were treated during 1938 in the Darjeeling district. In the other districts a sum of Rs. 61,740 was distributed to the respective district boards, the basis of allotment being the expenditure by the boards on the treatment of the disease and the numbers of patients treated in each district. The Government also spent a sum of Rs. 20,700 for treating kala-azar patients in the various medical institutions of the province.

In Assam the number of deaths from kala-azar in 1938 was greater than that of the preceding year by 281 and the number of patients by 5,217. Medical officers of dispensaries were deputed to survey villages within their areas of jurisdiction and subassistant surgeons belonging to the Public Health Department carried out similar surveys in other areas where a recrudescence of the disease was suspected. In consequence of these investigations many new centres for treatment were started in different parts of the province. The following table gives the numbers of kala-azar cases treated in the province during the years 1928-38.

TABLE II (*vii*)

Districts.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.
Cachar	394	470	376	370	391	472	529	478	574	445	716
Sylhet	8,988	9,162	6,726	5,512	4,719	4,210	4,612	3,869	3,645	3,672	4,622
Goalpara	2,316	2,389	1,439	992	1,089	1,159	1,107	1,245	1,276	2,046	2,541
Kamrup	3,577	2,598	1,814	1,690	2,061	2,223	2,197	1,465	1,309	918	1,189
Darrang	2,228	1,399	1,106	942	665	757	876	738	636	514	989
Nowgong	2,614	2,433	1,440	1,057	1,075	1,663	1,726	1,651	1,471	2,317	3,265
Sibsagar	1,555	2,387	1,495	1,095	1,269	1,251	1,372	938	864	1,396	3,050
Lakhimpur	28	23	23	3	12	13	18	12	6	2	13
Khasi and Jaintia Hills	6	..	..	..	..	1	5	..	..	..	..
Naga Hills	5	9	21	5	16	12	14	7	5	15	39
Lushai Hills	1	..	..	4	2	1	..	..	..	..	..
Garo Hills	1,690	2,905	1,905	882	605	850	927	690	793	717	824
Sadiya Frontier Tract	8	3	2	2	1	2	1	..	..	2	..
Manipur State	166	35	83	38	53	36	14	7	8	7	20
Total	23,576	23,813	16,430	12,592	11,958	12,650	13,398	11,100	10,587	12,051	17,268

SECTION III.

MATERNITY AND CHILD WELFARE.

Introduction.

26. The outstanding event of the year was the publication of the Report on Maternity and Child Welfare in India by a special committee appointed by the Central Advisory Board of Health to review the existing maternity and child welfare services in this country. In view of the importance of the committee's recommendations chronological exactitude was sacrificed and an account of the committee's findings was included in the report of the Public Health Commissioner with the Government of India for 1937. It is unnecessary to repeat the summary already given, but the importance of the subject warrants the attention of all official and voluntary organisations concerned with work in this field being again directed to the report. The report was adopted in its entirety at the second meeting of the Central Advisory Board of Health in Madras in January 1939.

The publication of the report is of too recent date to have had any influence on the organisation or extension of maternity and child welfare work in the provinces and the situation in the provinces has not materially changed.

Keen interest continues to be manifested in the welfare of women and children by voluntary organisations and in certain provinces by official agencies, and there is evidence that the importance of the work not only to the well-being of individuals, but also to the efficiency and prosperity of the nation is being increasingly recognised. Women's organisations particularly are alive to the situation, and sooner or later they will take steps to have the resolutions passed at their annual conferences implemented. The driving force of public opinion has potentialities which, if properly directed by expert advice, hold out a hopeful prospect for the future but, if misdirected, may result in wasteful expenditure, uncoordinated effort and diminished benefit to the community.

The limited number of medical women employed as directors of maternity and child welfare is a severe handicap to the utility of the work. One result is the scanty information submitted by the provinces and States regarding the facilities available for the care of women and children throughout India ; this in turn makes the compilation of this section of the annual report difficult and considerably diminishes its value as a means of reviewing progress and appraising the value of the work undertaken. It is admittedly difficult to collect information regarding the work in civil child welfare centres and the time may not yet be ripe for the introduction of tabular statistical forms in this field, but statistics relating to the provision of hospital beds for expectant and lying-in mothers are available and can be given in provincial public health reports.

In Sind and Madras efforts were made during the year to elicit particulars of the causes of deaths directly due to childbearing. In Madras special forms have been drawn up for use in the larger city maternity hospitals as well as modified forms for use in welfare centres, dispensaries and district hospitals. In Sind municipal towns employing qualified health officers were asked to collect the information. The figures for 1938 are said to be meagre, but the scheme has been inaugurated and future returns are expected to be more valuable. The next step required is the collection of similar information regarding the causes of death amongst infants and toddlers. A limited enquiry carried out in hospitals and welfare centres is the only possible prospect at the moment.

Closely connected with this suggestion are the questions of the training in pediatrics given to medical students and the facilities available for admission to hospital of sick children. Both of these are known to be unsatisfactory and while the subject may not be considered to be the direct responsibility of the health departments, the complementary nature of the scheme makes the provision of children's hospitals a subject of vital interest to the public health authorities.

Maternal Mortality.

27. Rates of maternal mortality from the provinces show wide variation. Further, as has been emphasised in previous reports, these rates cannot, on account of defective registration of births and deaths and unreliable certification of the causes of deaths, be accepted as representing, with any degree of accuracy, the true state of affairs.

A considerable amount of information relating to maternal deaths has been, however, collected for 1938 from hospitals having 300 deliveries or more per year. Hospital figures relate to a select population of only those women who are able and willing to enter a hospital for confinement, and are therefore not representative of the community as a whole. Most of the hospitals from which returns were received are situated in large cities and, except for a certain number of cases admitted from the surrounding rural areas (often late in labour), hospital figures represent urban conditions. Further, hospital cases include a high proportion of cases of abnormal labour and complications of pregnancy. Special enquiries conducted in a few areas on the whole population, suggest that obstructed labour and eclampsia have a high hospitalisation rate while, on the other hand, abortion, anæmia of pregnancy, puerperal sepsis after delivery outside, and cases of intercurrent diseases associated with pregnancy are relatively less likely to gain admittance to these institutions.

These facts have to be borne in mind in considering the hospital figures for 1938 which are discussed below.

The total number of maternal deaths for which detailed information is available is 1,558 of which 1,368 (88·1 per cent) are due directly to childbearing and 190 (11·9 per cent) are due to diseases associated with childbearing. The deaths have been classified according to the divisions of the International List of Causes of Death, with an additional heading for anæmia. Anæmia deaths have been classified with the deaths due directly to childbearing and not those due to associated diseases because of the intimate relationship which exists between pregnancy and anæmia.

The distribution by cause is shown in the following table :—

TABLE III(*i*).

Cause of death.	Number of deaths.	Percentage of total (1,368).
Abortion, septic	19	1·39
Abortion, non-septic	10	0·73
Ectopic gestation	7	0·51
Other accidents of pregnancy	8	0·58
Placenta prævia	70	5·12

Cause of death.	Number of deaths.	Percentage of total (1,368).
Other hæmorrhages	111	8·11
Puerperal sepsis	354	25·88
Puerperal tetanus	2	0·15
Eclampsia	211	15·42
Albuminuria and chronic nephritis	96	7·02
Other toxæmias	27	1·97
Embolism, thrombosis and sudden death	33	2·41
Accidents of labour	164	11·99
Unspecified conditions	1	0·07
Anæmia	255	18·64
Total deaths due directly to childbearing	1,368	100·00
Deaths due to diseases associated with childbearing	190	..
Total	1,558	

The outstanding importance of puerperal sepsis (25·88 per cent) and toxæmias of pregnancy, especially of eclampsia, are well shown in this table. This corresponds with findings in other countries. The high figure for deaths due to anæmia is, however, particularly noteworthy, for it indicates the importance of this complication of pregnancy as a cause of maternal deaths in India. The importance of anæmia is by no means limited to the 18·64 per cent of deaths for which it was the only cause found, for many deaths from sepsis, and albuminuria of pregnancy occurred as terminal events in the course of a severe anæmia. Such deaths, however, have been included in their respective groups.

Age and Cause of Death.

The following table shows that, in the age-periods under 20 years, eclampsia caused more deaths than even sepsis. Anæmia also was of relatively high importance in young women. In the later age groups sepsis and anæmia were the most important causes.

Table III (*ii*).

Cause of death.	Age groups. 12-15.	16-20.	21-25.	26-30.	31-35.	36-40.	41-45.
Abortion, septic	..	1·3	0·8	0·9	3·0	4·7	..
Abortion, non-septic	..	0·8	0·5	0·6	1·8	..	..
Ectopic gestation	..	0·3	0·5	0·3	1·8	..	..
Other accidents of pregnancy	..	1·0	0·3	0·3	1·2	..	..
Placenta prævia	..	..	5·7	7·3	11·5	7·8	8·3
Other hæmorrhages	..	3·8	7·0	12·6	11·5	14·1	8·3
Puerperal sepsis	25·0	23·9	29·4	26·8	23·6	17·2	33·4
Puerperal tetanus	..	0·3	..	0·3	0·3	..	..
Eclampsia	34·3	32·6	11·5	4·2	7·5	1·6	8·3
Albuminuria and chronic nephritis	6·3	7·1	7·6	7·3	5·5	7·8	..
Other toxæmias	..	2·8	1·0	1·9	1·8	4·7	..
Embolism, thrombosis and sudden death	..	2·5	2·1	1·9	3·6	3·1	8·3
Accidents of labour	3·1	7·4	11·2	16·7	12·7	23·4	16·7

Cause of death.	Age groups.						
	12-15.	16-20.	21-25.	26-30.	31-35.	36-40.	41-45.
Unspecified conditions . . .	..	..	..	..	0·6	..	..
Anæmia	31·3	16·2	22·4	18·9	13·9	15·6	16·7
Total .	100·0	100·0	100·0	100·0	100·0	100·0	100·0

PARITY OF MOTHERS AND CAUSE OF DEATH.

The distribution of deaths by parity and cause shown in table III(*iii*) indicates a high proportion of eclampsia deaths amongst primigravidæ, with sepsis, anæmia and accidents of labour in decreasing importance. In multigravidæ, on the other hand, sepsis and anæmia were of almost equal importance in the second pregnancy. Hæmorrhage is of increasing importance as parity increases and this is clearly shown both by the figures for placenta prævia and also for other hæmorrhages. Deaths from septic abortion show a tendency to increase with the higher parity. Accidents of labour are more important relatively in older women.

[Table

Table III(*iii*).

Cause of death.	Parity. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15 and over.
Abortion, septic	0·5	1·0	3·0	..	0·9	1·1	5·0	..	4·3	9·5	..	..	..	..	..
Abortion, non-septic	0·7	0·5	..	1·5	0·9	1·1	1·2	..	2·1	..	..	..	..	..	..
Ectopic gestation	0·9	0·5	..	..	0·9	..	..	..	..	..	4·3	..	..	..	..
Other accidents of pregnancy	0·2	0·5	0·6	0·8	0·9	..	2·5	..	2·1	..	..	..	..	..	..
Placenta prævia	0·9	2·4	4·9	5·3	6·0	13·8	8·8	11·4	6·4	14·3	26·2	..	20·0	33·3	25·0
Other hæmorrhages	3·0	6·8	4·9	12·1	10·2	17·2	8·8	18·2	19·1	9·5	21·7	..	40·0	..	..
Puerperal sepsis	25·6	27·6	33·5	26·5	26·5	18·4	17·3	25·0	25·6	14·3	13·1	33·3	40·0	66·7	25·0
Puerperal tetanus	0·5	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Eclampsia	33·3	12·1	7·3	9·1	5·1	2·4	6·3	4·5	2·1	9·5	4·3	..	..	..	..
Albuminuria and chronic nephritis	7·7	8·3	4·9	6·1	7·7	3·4	8·8	4·5	10·6	9·5	8·7	..	..	..	..
Other toxæmias	1·9	2·4	1·8	0·8	2·6	1·1	3·8	2·3	..	4·8	..	16·7	..	..	..
Embolism, thrombosis and sudden death	2·6	1·5	4·9	1·5	1·7	2·4	1·2	2·3	2·1	4·8	4·3	..	..	..	..
Accidents of labour	7·0	11·2	17·7	13·6	14·5	16·1	11·3	18·2	12·8	23·8	13·1	33·3	..	..	..
Unspecified conditions	..	..	..	..	0·9	..	..	..	..	..	..	..	..	..	..
Anæmia	15·2	25·2	16·5	22·7	21·2	23·0	25·0	13·6	12·8	..	4·3	16·7	..	..	50·0
Total	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

Midwifery Services.

28. The anomalous position of the *dai* under the provincial Nurses, Midwives and Health Visitors Registration Acts has already been commented on in previous reports. Except in the Punjab the law ignores her, although in many provinces the training and certification of indigenous *dais* are proceeding energetically and considerable sums of money are being expended for this purpose. In the United Provinces the question of amending the Nurses, Midwives and Health Visitors Registration Act to include *dais* is under consideration.

Local authorities hold divergent opinions as to whether the registration of the *dai* should be done centrally by the Nurses, Midwives and Health Visitors Councils established under the Acts or whether she should be registered and licensed by the local authority of the town or district in which she practises. Registration by the Nurses, Midwives and Health Visitors Councils would make for uniformity in the standards of training and examination and would secure the maintenance of the register by an organisation competent to appraise the qualifications of the applicant for admission to the register. Further local pressure would be less likely to influence the result. Against these advantages must be set the enormous amount of work which would devolve on the Nurses, Midwives and Health Visitors Council and the difficulty of maintaining accurate records of the distribution of the *dais* by towns and districts. This latter duty would eventually devolve on the local authority of the area of work of the *dai* and on this authority would also fall the duty of supervision. In the first instance, until more is known of the extent and nature of the problems likely to arise, the registration of the *dais* by districts instead of centrally seems best to meet the situation. Many municipalities already possess powers under Municipal Acts to regulate the practice of midwifery within the limits of their jurisdiction, but few have exercised these powers. In Bihar action has been taken in this direction during the year. The Director of Public Health states that " the municipal commissioners have framed byelaws, under Section 14(I) of the Bihar and Orissa Nurses Registration Act, 1935, to restrict the practice of unqualified *dais*. They have moved the local government to confirm and publish the byelaws, with the proviso that the byelaws may come into force on the 1st January 1941 and that, if the municipal commissioners consider on the 1st January 1941 that the number of trained *dais* is not sufficient, they will have the right to extend the said date ". Training classes for *dais* are held at most of the Sadar and Sub-divisional hospitals in this province. Four hundred and ninetytwo *dais* were trained and registered in the Punjab in 1938 as against 216 in 1937. In the Central Provinces 55 *dai's* certificates were issued during the year and 650 *dais* were under training. These provinces issue their own certificates. In addition 139 Victoria Memorial Scholarships Fund certificates were issued during the year by the Maternity and Child Welfare Bureau, Indian Red Cross Society, against 119 in 1937.

In Bombay, 79 *dais* were trained during the year under the auspices of the Lady Wilson Village Maternity Association which has now been amalgamated with the Bombay Mofussil Maternity, Child Welfare and Health Council. The Bombay Mofussil Maternity, Child Welfare and Health Council has also suggested a course of training lasting one year for assistant midwives, the object being to abolish the indigenous *dai* by providing a more qualified type of worker for rural areas. As part of the scheme of medical relief for rural areas in Bombay, the Government have sanctioned a scheme for subsidising nurse-midwives. The scheme provides that each district local body can appoint four nurse midwives and receive 4/5ths of the cost from govern-

ment. The number appointed during the year was 16 against the budget provision for 76.

In Sind a branch of the Countess of Dufferin's Fund was formed to provide for the training of women as hospital assistant nurses and midwives and to render such help as might be necessary in the sphere of medical relief. Two schools have been selected for the training of midwives, namely, the Lady Dufferin Hospital, Karachi, and the Louise Lawrence School of Midwifery. A scheme for the training and employment of midwives as a nucleus for the formation of a provincial maternity and child welfare service has also been submitted to the Sind government.

The training of *dais* is officially discouraged in Madras Presidency.

Lack of any agreed definition of the word *dai* makes the differences between the provinces more apparent than real. Many of the women now being trained, for example in Bihar and in *dais* training schools do not belong to the illiterate, hereditary *dai* class, but are of a standard more comparable to the lower grades of midwives in other provinces.

The returns from centres training *dais* indicate that very little attempt is being made to retain a hold over the trained *dais* by supervision, refresher courses and follow up. Supervision after training is essential and perhaps the very considerable activity now taking place with regard to registration may be taken as evidence that the generally accepted principle of supervision is about to be put into practice. A knowledge of the numbers of midwives practising and of the area of their practice is the first step towards supervision.

Seven schools for the training of *dais*, indigenous and others, were in existence in 1937 in Ajmere, Rajputana ; Sylhet and Silchar, Assam ; Dera Ismail Khan and Peshawar, the North-West Frontier Province ; Sukkur and Hyderabad, Sind. The demand from Indian States, tea gardens and local bodies for the services of *dais* trained at these schools is greater than can be met and this is evidence of the fact that these schools are meeting the need in a way which gives satisfaction to the employing authorities.

Domiciliary and Institutional Midwifery.

Information regarding the provision for institutional midwifery continues to be scanty. One hundred and fortythree beds are maintained in 12 hospitals in the North-West Frontier Province. In Sind six of the seven headquarters municipal committees maintain women's hospitals or maternity homes and one gives financial assistance to a voluntary organisation. In the larger municipal towns the services of trained *dais* and midwives are easily obtained owing to the opening of private maternity homes, but in the rural areas very little skilled assistance at confinements is available. The Director of Public Health writes that none of the district boards except that of Larkana, which maintains 19 rural maternity homes, takes sufficient interest in the maintenance of this service to the public.

Infant and Child Welfare.

29. Table III (*vi*) gives consolidated figures for the numbers of welfare centres and health visitors employed during the past six years.

TABLE III(*iv*)

	Centres maintained by Government. R.	Government. U.	Local bodies. R.	Local bodies. U.	Voluntary organisations. R.	Voluntary organisations. U.	Total. R.	Total. U.	Total centres.	Health Visitors. R.	Health Visitors. U.	Total No. of centres under trained health visitors.
1933*	·2	6	186	157	71	149	259	312	571	34	186	220
1934	13	7	233	193	91	147	337	347	684	31	205	236
1935	15	7	162	247	49	207	326	461	787	51	225	276
1936	10	9	218	215	113	268	341	492	833	52	244	296
1937	19	10	332	305	72	172	423	486	909	62	251	313
1938	18	13	362	349	62	189	442	551	993	69	252	321

* Including Burma.

The statement shows a gradual, if slow, increase in the number of centres from 571 in 1933 to 993 in 1938. More significant is the fact that only approximately one-third of the centres are in charge of trained health visitors. The percentage of centres which may be regarded as adequately staffed to carry out sound educational work has not materially altered during the period under review, the figures being 38·5 per cent in 1933 and 32·3 per cent in 1938. In the early days of the maternity and child welfare movement the services of qualified health visitors were not easily obtainable and it is perhaps as well that the pioneers did not stop to consider too long the difficulties and drawbacks attendant on the employment of imperfectly trained workers. At the present time there is less excuse for contentment with a worker who has no knowledge or experience of preventive and educational health work. In the absence of these qualifications the worker tends to concentrate on the actual delivery service, the charitable distribution of material comforts and the dispensing of medicines. Those services are of unquestioned value, but they do not constitute the fundamental basis nor the most vital aspect of maternity and child welfare work. Material and medical relief brings only temporary amelioration in the health of the mother and her children while a delivery service, without the accompanying prenatal care of the mother, will do little to eliminate abnormalities from the practice of the midwife, to conserve the wellbeing of the mother or to prevent the occurrence of stillbirths, neonatal deaths and disabilities amongst the children born. The aim of maternity and child welfare work, namely, that of educating parents in the precautions to be taken and the rules to be followed for securing positive and abundant health for themselves and their children, cannot be overstressed. If education is to have lasting value, " consistent, persistent and insistant " persuasion is necessary to secure the practice of the principles taught.

Child Welfare Work.

RAILWAYS.

30. Child welfare work on the railways has reached a considerable degree of development. Families of employees are entitled to free medical attention in railway hospitals and dispensaries and accommodation for confinement is provided in several hospitals. Nurses and midwives have been employed in railway hospitals since 1909.

In 1932 the Medical Section of the Indian Railway Conference Association discussed the advisability of enlarging the scope of maternity and child welfare work on the railways. " At this Conference, the Chief Medical Officers drew the attention of the Railway administration to the remarks of the Public Health Commissioner with the Government of India in his Annual Report for 1928 emphasising the gain in the shape of stablised labour which results from maternity and child welfare work among the families of the employees. In view, therefore, of modern trends of thought and generally accepted practice it was resolved to recommend that maternity and child welfare work be fostered on the Railways. The Conference pointed out that such activities could be divided into two separate but coordinated categories—one consisting of the official medical facilities provided for wives, children and dependents as required under the rules, the other relating to the establishment of welfare centres for instructional and propaganda purposes, the visiting of mothers and children in their homes, the distribution of milk and cheap clothing and the organisation of baby shows, etc. It was decided that work under the second category should be controlled by committees of voluntary workers and supported by unofficial funds augmented, if possible, by grants from the Staff Benefit Fund ".

A review of the existing services in 1932 showed that the Bombay, Baroda and Central India Railway had since 1929 maintained 11 maternity and child welfare centres, the North Western Railway five maternity and child welfare centres and one midwife while the Madras and Southern Mahratta Railway had two centres. During the succeeding five years very considerable expansion has taken place. The Bombay, Baroda and Central India, the Great Indian Peninsula, North Western, Bengal Nagpur and Assam Bengal Railways in 1938 maintained 33 welfare centres with a staff of doctors, health visitors and midwives at a cost of nearly one lakh of rupees (Rs. 93,222). Preventive and educational work is maintained on a voluntary basis and is additional to the officially maintained curative and obstetric services in hospitals and dispensaries.

Apart from the usual welfare centre activities and home visiting, women's classes are held, lectures are given to fathers on home hygiene and baby shows are regularly held. Clean and tidy homes and garden competitions are held and the effect of these in some of the railway colonies has been very striking. Each centre has at least one free cinema show including health films each year. *Dais* training classes are conducted and scholarships for the training of health visitors have been provided.

Since the welfare work started, the welfare staff of the Bombay, Baroda and Central India Railway have been responsible for 6,338 confinements with the very creditable mortality rate of 1·7 per 1,000 cases.

Misunderstandings were encountered in the initial stages of the work regarding the respective spheres of work of the official medical services and the voluntary maternity and child welfare organisations, but mutual cooperation and a better recognition of the respective complementary rôles of the welfare centre and the hospital have now been achieved.

General Population.

In the field of civil maternity and child welfare, the position remains much the same as in 1937 and fresh developments alone are reviewed. In Sind a maternity and child welfare sub-committee of the Sind Branch, Indian Red Cross Society, was established during the year and has done much to further a more uniform standard of work throughout the province.

In Madras 40 women medical officers, 43 health visitors and 439 midwives were employed during the year on approved schemes as against 32 medical officers, 17 health visitors and 351 midwives in 1937. The Madras Corporation adopted a scheme for the city maternity and child welfare services which will bring the work more into line with government schemes in the Presidency. The staff, under the reorganisation scheme, will be increased to eight medical women and twelve health visitors in 1939.

In addition to two medical women, 26 health visitors and 17 centres maintained by the Delhi Municipal Committees for maternity and child welfare for a population of approximately 464,000, there were in 1938, nine fully equipped and staffed welfare centres for a rural population of 220,000, which is perhaps better provision for a rural area of similar size than is found anywhere else throughout India.

Proposals have been submitted to the Government in the North-West Frontier Province to transfer all infant welfare centres to the provincial branch of the Indian Red Cross Society for maintenance and supervision, to establish a centre in each district and to provide government grants-in-aid for approved centres.

In the Punjab an interesting development took place during the year. The Inspector-General of Civil Hospitals issued instructions that medical women attached to civil hospitals should conduct prenatal clinics in welfare centres under the health department as part of their recognised duties. The result has been that more centres are now holding special prenatal consultations and there has been a marked improvement in the quality of the service given. The need for constant supervision of the staff employed in health work is stressed in the Punjab report. Supervisory visits rose from 74 in 1937 to 111 in 1938.

Health Schools.

31. The numbers of health visitors trained during the year were eleven in the Punjab Health School, Lahore, nine in the Lady Reading Health School, Delhi, eight in the Nagpur Health School, six in the Bombay Presidency Infant Welfare Society Health School, eight in the Madras Health School and eight in the Seva Sadan Health School, Poona.

The Sir John Anderson Health School, Calcutta, was opened in 1937, but as the course is of 18 months' duration no students passed out in 1938. The Poona Health School was taken over from the Seva Sadan Society by the Bombay Mofussil Maternity, Child Welfare and Health Council, reorganised and reopened in 1938. The Madras Health School maintained by the Madras Branch, Indian Red Cross Society, closed during the year under review, but a few months later the provincial Government established a school for the training of health visitors. The course in Madras lasts 11 months, which includes three months' nursing practice at the Prince of Wales Children's Hospital, rural experience at the Poonamallee Health Unit and practical training in the centres run by the Madras Corporation.

The number of health schools in India has remained practically unchanged throughout the past decade, the Bombay Presidency Infant Welfare Society Health School being the only new institution. Other schools have, however, had vicissitudes in fortune, being closed at times or experiencing changes in the body of management. The Lucknow Health School, which closed in 1932, has not yet been reopened, although one lakh of rupees from the Silver Jubilee Fund has been set aside for the erection of a new building.

The total number of health schools in India in 1938 was seven, with accommodation for training 70 pupils per annum. Although the demand for health visitors exceeds the supply, few of the schools are running to their maximum capacity. Dearth of qualified candidates is a factor for the maintenance of the relatively high scale of salary now secured by health visitors, which in turn leads to the demand for a less efficient grade of worker on a lower salary. The disadvantages of this policy are fully discussed in the Report on Maternity and Child Welfare by the special committee of the Central Advisory Board of Health.

The outstanding need of the moment is the carrying out, by health departments, of systematic reviews of the maternity and child welfare services within their areas. The review should include a survey of the schemes in their entirety as well as an examination of the various branches of the work individually. On the review an appraisal can be made, with some accuracy, of the extent to which the area is covered by the welfare services, the degree of availability of skilled attendance at the time of birth, the adequacy of the provision for maternity and children's hospitals, the distribution of the welfare centres in relation to the needs of the population and the efficiency of the arrangements for home visiting and medical consultations at prenatal clinics. Unless the position is reviewed periodically it is impossible to evaluate the work being done or to judge how far the money, skill and human effort devoted to the services are being wisely expended.

SECTION IV.

THE HEALTH ACTIVITIES OF PROVINCIAL GOVERNMENTS AND SOME OTHER HEALTH ADMINISTRATIONS.

Introduction.

32. A comprehensive review of the development of public health administration in India from the beginning of the present century was given in the report for 1937. In such a survey of the march of events over a long period of years it was possible to view the health problems of the country in their proper perspective, to assess the progress made in different directions and to indicate the trend of possible lines of advance for the future. It is not proposed to attempt a similar survey in this year's report. Short accounts are given below of various activities of provincial public health departments which do not find a place elsewhere in this report.

School Health and Medical Inspection of School Children.

33. School health work forms an important part of the general scheme of health administration for the community. The large majority of the school children spend the greater part of their lives in their homes and the conditions under which their home life is spent must largely influence their health and well-being. Even so their aggregation in schools for a few hours in the day creates special health problems such as those of the spread of infectious disease and it also provides valuable opportunities for health work among these children. The aim and scope of school health work should be that of creating an environment conducive to the healthy development of the physical and mental powers of the children and of inculcating in them, by example and precept, such habits as are essential for the maintenance of their health. The provision of hygienic surroundings, adequate nutrition, exercise and rest, periodical medical examination and correction of the defects discovered, health education, the development of a corporate life and the awakening of the child's interest for an active participation in such life, these are all part of the campaign of health in schools. Medical inspection without adequate provision for the treatment of defects is largely barren of results . Instruction in health matters by formal teaching from text books fails to produce any lasting benefit unless the necessary hygienic appliances are provided and the pupils are taught, by the example of the teachers, the correct use of such appliances. An ill-nourished child can hardly derive sufficient benefit from his education and, in the case of large numbers of school children, public provision to supplement their diet, either without payment or at a reduced cost, appears to be essential if their physical health and mental efficiency are to be maintained.

School health work can play an important part in promoting the welfare of the community by socialising the outlook of the children and by providing them with opportunities for active participation in health work. In this connection the lead * given by the educational authorities in the Punjab may be quoted as an example deserving adoption in other parts of India. In 1925 and 1926 district community councils were established at the headquarters of each district in the province with the District Inspector of Schools, in the

* "The Better Village Movement in the Punjab and the Part Played by Village School " by F. L. Brayne and the Education Department of the Government of India, page 48 of the Report of the 7th Biennial Conference, Tokyo, Japan, by the Health Section of the World Federation of Education Association.

majority of cases, as the secretary. Another innovation was that community work was introduced as part of the course at the training schools for vernacular teachers. The village schoolmaster can play an important part in rural development. His intelligent cooperation is necessary not only for securing the goodwill and confidence of the people when new and unfamiliar ideas are presented to them, but also for instilling in the minds of the rising generation certain elementary principles regarding health, agriculture and cooperation which are all essential for developing community life on proper lines. The training course for pupil teachers includes these subjects and special emphasis is laid on the practical application of the principles that are taught. They are taught to organise among themselves and manage on their own initiative supply societies, thrift societies and Red Cross societies. They are taught elementary hygienic principles and are required to carry out, with their own hands, such works as the cleansing of streets, removal of vegetation from choked drains and disposal of manure and street sweepings in pits. They are also taught simple facts relating to the control of infectious disease, improvement of housing conditions and methods of health education. In consequence of these changes in the curriculum in training schools for teachers, it is stated that the pupils of rural schools are taking an active part in health work and in other measures designed for the welfare of the people. During epidemics, they assist by active propaganda in the carrying out of preventive measures such as chlorination of wells, vaccination against smallpox and inoculation against other diseases. They also take part in the distribution of quinine during epidemics of malaria and in intensive cleanliness campaigns in the villages situated close to their schools. Apart from the direct benefit that accrues to the community from these activities, the possibilities arising out of the training that awakens in these children the desire to serve the community cannot be overemphasised.

In the following paragraphs the school health work carried out in the provinces during 1938 has been briefly summarised. Certain provinces have devoted but little or no attention to this branch of health administration while, in a few, activities of a varied character have been inaugurated. However, speaking of British India as a whole, it is not incorrect to say that the pace at which improvement is being effected in the measures designed for the welfare of school children is definitely slow and should be accelerated.

In the N.-W. F. Province medical inspection of school children is carried out in the six district headquarter towns by four wholetime and two part-time subassistant surgeons. In the rural areas subsidised medical practitioners are responsible for this work in their respective villages. The scheme was extended to seven villages in the province during 1938. In Peshawar city a female subassistant surgeon carries out the inspection of the pupils of the high schools for girls.

In the six headquarter towns, 53,172 school children were examined. Of these 1,467 were girls attending schools in Peshawar. Treatment was recommended for 16,808 children (31·6 per cent) and of these 79·4 per cent received treatment for their defects. In the rural schools 1,853 pupils were examined. Of these 47·9 per cent actually underwent treatment.

As regards nutrition it is reported that, in six high schools in Peshawar, midday meals are being served to the children and that 2,866 boys are receiving milk. Lectures on personal hygiene and first aid were given, it is stated, to the students of all the high schools in the province. A number of school buildings was inspected and the defects discovered were brought to the notice of the school authorities concerned for necessary action.

The Director of Public Health, Punjab, states that medical inspection of schools in the urban areas had been conducted during 1931-37 on an experimental basis and that, in 1938, the Government decided on the basis of the experience gained in the organisation of this work, that the control of medical inspection in the municipalities with health officers should be entrusted to those officers. The Public Health Department issued a memorandum outlining a scheme for the establishment and maintenance of medical inspection in schools by voluntary subscriptions from students. The response to this circular has been so encouraging that the number of municipalities with properly organised schemes for medical inspection quickly rose from three to eight by the end of the year under review. In these eight municipalities 35,914 boys and 7,839 girls were medically examined during 1938. In two towns the expense is met entirely from voluntary subscriptions from the pupils of the classes above the primary standard, while in the other six towns the municipal committees bear either the whole cost or contribute part of it. The Director of Public Health points out that a gratifying feature of the development of school health work in the province has been the acceptance of the contributory principle by the parents of the pupils.

As regards treatment of defects, in some cases provision for it has been made as part of the medical inspection scheme and in others treatment has been left entirely to the parents who are informed regarding the defects discovered in their children. In a few cases it is reported that provision has been made for the free supply of milk and of articles like spectacles to the poorer children.

In Delhi province the organisation for the medical care of school children in New Delhi is stated to be satisfactory, in the Notified Area Civil Lines to be the next best and in Delhi City to be the least efficient of the three. The work of the school medical officers in New Delhi has grown, it is stated, both in efficiency and in popularity. During the year under review the Bengalee schools for boys and girls joined the scheme. The following figures quoted from the report of the Chief Health Officer show the volume of work accomplished during 1938 :—

	Boys.		Girls.	
	1938.	1937.	1938.	1937.
Annual routine inspections	1,450	1,227	1,457	1,160
Clinic attendances	16,400	10,600	15,478	13,924
Eye clinic attendances	712	448	772	460
Dental clinic attendances	913	432	930	433
Revaccinations	859	755	877	122
Cholera inoculations	497	..	386	..
Home visits	84	60	60	..
Lectures	83	..	30	..

Compared with 1937 there has been an appreciable rise in the services rendered under each head in respect of both boys and girls.

It is stated that school medical officers are required to visit the homes of the pupils who absent themselves from school for three days and of those who are reported to be suffering from infectious disease. The value of such visits is stated to be considerable because they enable the medical officers to establish the correct diagnosis in many cases, to prevent children from returning to school while still in an infectious state, and to carry out preventive measures such as isolation of the patient and surveillance of contacts, in so far as home conditions permit of the enforcement of such measures. Improvements introduced during the year included the employment of a trained nurse at the primary school in the city extension area for carrying out treatment for minor

ailments under the instructions of the school medical officer, the issue of stock remedies for such treatment, the introduction of fuller record cards and health education of the children by lectures given by the medical officers with the aid of magic lantern slides and cinema films.

The chief causes for which attendances at the clinics were recorded were respiratory diseases (23·4 per cent for boys and 31·4 per cent for girls), external eye conditions (13·1 and 17·4 respectively), skin diseases (12·9, boys) and malnutrition (6·7 and 18·4 respectively). During the course of the annual routine examination 79·6 per cent of the boys and 75·4 per cent of the girls were found to be suffering from at least one defect. The dental surgeon laid stress on the need for improving the diet of the children and he deprecated the use of starchy and sugary articles of food at the expense of vegetables and fruits.

The Chief Health Officer has summarised in his report the results of certain experiments with milk as a supplement to the diet of the children. His general conclusions are that the addition of one pound of whole milk to the diet of the child has a profound effect on his health and growth, that half a pound of whole milk, while not so beneficial, produces appreciable benefit and can therefore be recommended for wide adoption and that a pound of skimmed milk appears to have approximately the same effect as half a pound of whole milk. The price of half a pound of pasteurised whole milk is only 9 pies while a pound of skimmed milk similarly treated costs one anna and the Health Department has therefore recommended the use of half a pound of whole milk.

In the Notified Area Civil Lines the number of students, including boys and girls, covered by the scheme of medical inspection was 445. During 1938 the scheme was reorganised, the medical officer-in-charge of the Balak Ram Hospital, Timarpur, and the lady doctor of the local welfare centre being the medical officers. Arrangements were also made for the services of a dentist and of an ophthalmologist. It is stated that the attendance of the boys at the clinics was not satisfactory because they had to travel some distance to the Balak Ram Hospital for the treatment of their ailments. An appeal to the parents to provide their children with milk also met with an unsatisfactory response.

In the rural areas school medical service is being rendered by the subassistant surgeons in charge of dispensaries but, in view of the distances to be covered, the arrangement is stated to be unsatisfactory. It is stated that, with the opening up of the countryside by the new roads that have been constructed and the utilisation of the services of the subassistant surgeons of two newly established dispensaries, it will be possible to improve the school medical service in the rural areas to some extent.

In the Najafgarh thana the transfer of this function to the Medical Officer of Health of the Health Unit has permitted, it is pointed out, of organising a system of follow up by the medical officer and his health visitors. First aid boxes have been issued to most schools in the area and further issues were to be made in 1939.

In the United Provinces wholetime school medical officers are working in 13 of the larger municipalities. In addition, in 19 municipalities, the medical officers of health are also carrying out the functions of school medical officer. Further, thirty district health officers are responsible for conducting school health work in the towns within their districts. It will thus be seen

that, in this province, considerable attention is being devoted to this branch of health administration in the urban areas. In five of the 13 municipalities mentioned above central school clinics have been working since 1934 and, in 1938, they were established in the remaining eight municipalities also.

The district health officers are also responsible for school health work in the rural areas of their districts. Although it has not been possible to organise medical examination and treatment of school children in the rural areas to the same extent as in the towns, the promotion of Junior Red Cross groups in village schools and the provision of first aid medicine chests are stated to have enabled the health authorities to organise work on useful lines.

The main defects discovered during medical inspection were enlarged tonsils and adenoids, dental defects (especially caries), anæmia, malnutrition, skin diseases and defective vision. The percentages of children in urban and rural areas with these defects are given below.

	Enlarged tonsils and adenoids.	Other glandular enlargement.	Dental defects.	Defective vision.	Malnutrition.	Skin diseases.	Anaemia (mainly due to chronic malaria).
Urban areas	12·9	6·8	13·7	13·3	19·4	3·3	0·6
Rural areas	2·7	1·9	8·2	Not available.	18·1	3·1	4·6

Except for anæmia the percentages for the rural areas are smaller than those for the urban areas. This may partly be due to the fact that the examination of rural children is not so thorough as of those in the towns. The higher percentage for anæmia in the children of village schools can be explained by the fact that the incidence of malaria is definitely higher in the rural areas and that the facilities for treatment are less than in towns. The figures for malnutrition are stated to be of doubtful value because of the personal factor involved in the assessment of this condition by different medical officers. It is also stated that the condition is not due so much to poverty as to faulty diet resulting from lack of knowledge regarding what constitutes a balanced diet.

In the cities of Agra, Cawnpore, Allahabad, Benares and Lucknow, a scheme for the free supply of milk to poor and ill-nourished children was in operation during 1938 as in previous years. The number of children benefitted by the scheme during the year was 611. In these cities facilities have also been provided for dental treatment and for the examination and correction of defects of vision. Poor children are provided with spectacles free of cost.

In Bihar, among 13,403 boys examined, 5,334 or 39·7 per cent were found to suffer from some disease or other. The percentages of those suffering from various ailments are given below :—

	Number of children.	Percentage of the total.
Malnutrition	2,230	16·6
Enlarged tonsils	1,386	10·3
Errors of refraction	1,214	9·0
Pyorrhoea and carious teeth	756	5·6
Enlarged glands in the neck	701	5·2
Functional heart troubles	161	1·2
Eye diseases	89	0·6
Adenoids	46	0·3

School medical officers, in addition to the medical examination of students and treatment of patients at the school clinics attached to divisional hospitals, give lectures on health subjects to the students. They also conduct regular inspections of school and hostel buildings and it is stated that these inspections have, in recent years, helped to improve the general sanitation of these premises.

A scheme for the supply of a midday meal on payment of annas eight per child per month has been working in a high school in Purulia since 1934 and it is reported that this scheme has now been adopted by a number of other high schools in the province.

In Orissa, 4,775 students were medically examined in the high schools and middle schools of the province. Of them 67 per cent showed some defect or other. As regards their nutritional state, for 34 per cent it was reported to be satisfactory, for 55 per cent it was fair and for 11 per cent unsatisfactory. The diet provided in the hostels attached to the schools consists mainly of rice, dal and vegetables, milk, ghee, meat and fish being taken occasionally and in small quantities by only a proportion of the students. Although certain schools provide a meal at midday, the majority of the schools do not and the desirability of paying more attention to this subject is stressed by the Director of Public Health.

In the rural areas the staff maintained by the district boards examined 4,094 pupils of the Middle English and Middle Vernacular schools and, of this number, 51 per cent were found to require treatment.

No examination of girl students was carried out during the year. Other activities of the school medical staff included health lectures to the students, inspection of school premises and hostels and a course of lectures during the summer vacation to the village people and teachers on village sanitation and control of epidemic diseases.

The work in relation to the medical inspection of schools in Bengal may be considered under three heads :—

(i) inspection of school children in Calcutta,

(ii) inspection in other municipalities,

(iii) inspection in rural areas.

In Calcutta the number of scholars medically examined was 8,342. In other municipalities 84 schools were visited by 26 medical officers and a total of 9,734 pupils was examined during the year. In the rural areas 144 schools were visited and 4,751 students were examined. The main facts revealed by these examinations are set out in tabular form below :—

Percentage of pupils among the total examined having :—

	Malnutrition.	Skin diseases.	Defective teeth.	Diseases of the nose.	Enlarged tonsils.	Enlarged adenoids.	Enlarged lymph glands.	Diseases of the eye.	Enlarged spleen.	Infectious diseases.
Calcutta . .	15·7	1·9	8·3	1·5	10·4	2·3	3·9	19·5	0·36	0·64
Other municipalities.	21·7	5·4	9·7	3·1	5·6	1·2	3·7	7·4	3·2	...
Rural areas .	28·0	16·7	6·0	3·2	2·8	1·2	1·4	1·1	13·5	4·4

A comparison of the figures for the three areas in the above table brings out certain interesting facts. As was stated in an earlier paragraph the figures for malnutrition must be considered to be of doubtful value for the reasons

already stated. In regard to the incidence of enlarged spleen, the figures for Calcutta, other municipalities and for rural areas clearly indicate that the malaria problem is more acute in the rural areas than in urban areas and that, compared with other towns, Calcutta enjoys greater freedom relatively from the incidence of this disease. The progressive rise in the figures for skin diseases as we pass from Calcutta to other municipalities and the rural areas is also striking. On the other hand eye diseases show a progressive diminution. It would be interesting to know the reasons responsible for such variations in the incidence of these conditions.

A movement known as the " Bratachari movement " is stated to have now become well established in quite a large number of the schools in the province. It is stated that this movement, " Besides contributing directly towards the improvement of health, has great moral spiritual and disciplinary effect on the young people and that it helps to direct youthful energies into healthy channels of good citizenship ". The Government sanctioned during the year, it is reported, a sum of Rs. 9,000 as a recurring grant and another sum of Rs. 1,000 as a non-recurring grant for the development of this movement. In addition, the Boy Scouts and Girl Guides movements are also stated to have shown encouraging development in the province, the Government sanctioning Rs. 6,000 and Rs. 1,000 respectively to these organisations. It is stated by the Director of Public Health that, during the year under review, a scheme for medical inspection in all the high schools in the province was approved by the Government and that a sum of Rs. 20,250 was sanctioned by the Education Department for this purpose. Another sum of Rs. 40,500 was also sanctioned for the supply of midday meals to school boys.

In addition to the activities outlined above the Calcutta University Students' Welfare Committee has made provision for the medical examination, on a voluntary basis, of the students attending colleges in Calcutta.

In the Central Provinces routine medical inspection of school children was conducted by assistant surgeons, assistant medical officers in charge of dispensaries and subassistant health officers on epidemic duty and monthly inspection reports were submitted by these officers to the Director of Public Health. During 1938 , 113.307 children were examined. In addition to the medical examination of the children, the inspection included investigations into the sufficiency of accommodations in schools, their lighting, ventilation and sanitation and the provision of drinking water.

In Bombay and Madras Presidencies routine examination of school children does not appear to have been carried out during the year, although inspection of schools in relation to the sanitation of the premises and health education work were carried out.

In Coorg also similar work was carried out for the improvement of school buildings and their surroundings, the provision of protected water supplies and of hygienic types of latrines.

In Assam, it is reported, that periodical medical inspections of selected institutions were carried out and that recommendations were made for the improvement of the health of the pupils and for the general sanitation of the hostels attached to those schools.

Fairs and Festivals.

34. Fairs and festivals play an important part in the life of the people, lending colour and variety to their otherwise drab existence. This remark applies in particular to the large rural population among whom, except during

the months when agricultural operations are in progress, little opportunities for employment exist and life becomes monotonous. The festivals that take place in different parts of the year give them opportunities for travel, for meeting people from other parts of the country and for taking part in religious and social activities. These gatherings have therefore an educative value on the population and the greater facilities that are now available for travel than in the past have increased the popularity of the festivals. In recognition of the opportunities that these gatherings provide for educating the people in matters useful to them in their daily lives, agricultural, industrial, health and other exhibitions are being held at many of the festivals.

At the same time festivals play an important part in the dissemination of infectious disease, particularly cholera. The health authorities in the country have recognized this danger and within recent years considerable attention has been paid to the importance of this problem. While in respect of some of the larger festival centres modern amenities such as a protected water supply and drainage are being provided on a permanent basis, for the large majority of festival centres action has been confined to the sanitary control of these areas during the period of the festival. This is partly due to the fact that the funds available are limited and that the provision of similar measures all the year round will not be possible. It is desirable that provincial health authorities should formulate a programme of improvements for all the larger festival centres in their areas, that the necessary works should be arranged in order of priority and that provision should be made for the execution of the scheme within a specific period of years. In this connection it may be mentioned that the necessary funds can be made available by various forms of taxation, which will fall mainly on those who can afford to pay and not on the poorer section of the pilgrims. Cattle fairs are often associated with these festivals. They also attract shop keepers and trade is briskly carried on on these occasions. A small tax on animals, vehicles, shops and on pilgrims should prove to be a source of recurring income to the authority responsible for the control of the festival. Further, temple authorities at festival centres derive a large part of their income from the celebrations and these authorities can legitimately be made to pay a share of what they collect for the improvement of the living conditions of the pilgrims from whom they derive their income. Statutory provision should be made for the collection of these funds and for their administration. A pilgrim committee on which all the local interests and the Government are represented would appear to be a suitable organisation for the purpose.

Brief notes on individual provinces are given below.

In the N.-W. F. Province it is stated that sanitary and medical arrangements were made as usual for all fairs and festivals held during 1938 and that no outbreak of any epidemic disease took place.

No fair of any outstanding importance was held in the Punjab during the year but it is reported that the *Kumbh* fairs held at Hardwar and Brindaban in the United Provinces between 1st February and 30th April necessitated the provision of special arrangements to prevent the importation of cholera into the province by the returning pilgrims. Nevertheless as has already been pointed out on page 25 of this report, cholera broke out on an extensive scale in many parts of the province as a result of the spread of infection from the Hardwar festival. The action taken to control the spread of cholera in the province has already been described on page 26.

In the United Provinces there take place every year a large number of festivals in different parts of the province. In addition there are some festival centres of special importance such as Hardwar, Benares and Brindaban. The Brindaban festival passed off without any outbreak of cholera except for an imported case from Bengal on 14th March. On the other hand, as has already been pointed out, there occurred in Hardwar an explosive outbreak of the disease which spread rapidly through the greater part of Northern India and produced many thousands of cases and deaths. Smaller outbreaks of cholera, it is reported, also took place in connection with four other festivals in the province, the maximum number of cases in any of these centres being 15.

Two festivals of importance are stated to have occurred in Bengal during 1938, namely, Ganga Sagar *mela* and Nagalbund *mela*. In previous years the Ganga Sagar *mela* was recognised as the focus from which cholera infection used to spread far and wide through Bengal and into the neighbouring provinces. It is stated that the sanitary control of the *mela* has within recent years been so satisfactory that the festival is now regarded as harmless from the point of view of infection. The health departments of the provincial Government, the Corporation of Calcutta, Calcutta port and the District Board of 24-Parganas all took part in the organisation of preventive measures during 1938 and it is reported that only 12 patients were admitted to the isolation ward provided for the festival and one case of cholera died on the way back from the festival.

During the Nagalbund *mela*, which was attended by 1,50,000 pilgrims it is reported that no outbreak of any infectious disease took place.

A large number of festivals is held every year in the province of Orissa. Most of these are of local interest and are attended by the people of the district in which they are held and by people from the adjoining districts. On the other hand there are certain festivals held at Puri which attract pilgrims from all over India. It is reported that the measures for sanitary control at Puri were elaborately planned and carried out and that, although cholera was prevalent in different parts of the district, the festivals passed off without any serious extension of the infection. In all there were only 44 attacks and 3 deaths.

In the Central Provinces subassistant health officers were on duty at all important festival centres for the purpose of organising sanitary and medical arrangements. During 1938 efforts were directed towards the improvement of water supplies and the provision of conservancy arrangements at these places. Chlorinated water for the use of pilgrims was made available in the pilgrim centres.

The success achieved in the control of cholera by the introduction of a system of indirect compulsory inoculation against the disease at Pandharpur in Bombay Presidency has already been mentioned in the last report and the year 1938 gave further proof of the efficacy of this measure. There were in all only three attacks and two deaths from cholera, although the festival was attended by 159,438 pilgrims and cholera broke out in two villages within eight and ten miles of Pandharpur about three weeks before the festival.

It is reported that sanitary arrangements were also made for other important festivals in the province and that no outbreak of cholera took place in them.

In Madras Presidency it is reported that all the festivals during 1938, which numbered 785, passed off without any outbreaks of epidemic disease, with the solitary exception of the festival at Bhadrachallam. Here, although the disease was brought under control in the festival area, it is reported that the returning pilgrims spread the infection to East and West Godavari and into the neighbouring districts. On the other hand Mahodayan festival, which takes place usually only in 20 to 30 years, was celebrated on 31st January in several seaside centres in the province. Elaborate sanitary arrangements were made by the local authorities concerned under the guidance of the public health staff and it is reported that no outbreak of cholera took place in any of these centres.

In Assam festivals took place in a number of centres but the gatherings were small in comparison with the festivals in other parts of India, the maximum number in the largest festival being in the neighbourhood of 12,000. The Public Health Department made the necessary arrangements at these festival centres and no outbreaks of epidemic disease are stated to have occurred.

Health Propaganda.

35. Health education of the people has engaged the increasing attention of provincial health authorities in recent years. All the usual methods of propaganda, such as lectures to groups of people, with or without magic lanterns and slides, film demonstrations, health exhibitions, distribution of leaflets, posters and pamphlets, have been employed by the health departments. Vans equipped with suitable propaganda material are employed in many provinces to carry the message of health to the rural population. The organisation of health weeks is widely practised in some provinces in order to focus the attention of the public on the subject of health and intensive efforts are made during the week for educating the people. Health songs and dramas render powerful aid to the movement because of the emotional content of the messages that they convey and these are being utilised particularly in schools in order to impart to the children elementary knowledge regarding health and disease. In the following paragraphs brief accounts are given of the activities in this direction during 1938 in individual provinces.

In the N.-W. F. Province, in addition to routine propaganda by means of posters, pamphlets and magic lantern lectures, it is reported that a health section was also provided at two exhibitions, an agricultural show at Tarnab (Peshawar) and a horse and cattle show at Kohat, which attracted large numbers of visitors.

The Bureau of Epidemiology of the Public Health Department, Punjab, is in charge of the preparation of propaganda material for the province. Broadcast talks were prepared on 26 subjects. In an All-India exhibition held in Lahore, the Bureau participated by providing a health stall. A small exhibition on health matters was also arranged at the Criminal Tribes Industrial Settlement, Moghalpura.

In the United Provinces a considerable amount of health education work was carried out during 1938. The Hygiene Publicity Bureau of the Public Health Department is in charge of this work and as the officers of the Bureau hold the additional posts of Honorary Secretaries of the U. P. Branch of the Indian Red Cross Society, the St. John Ambulance Association and the Junior Red Cross, coordination of the activities of these organisations with those of the Health Department in the field of health education is ensured.

In 1938 a total of 4,804 Junior Red Cross groups functioned in 3,958 schools. The number of members was 109,950. The health activities of these children were of a varied character. They participated in preventive work against epidemic diseases, such as distribution of quinine for malaria, sterilisation of wells with potassium permanganate, distribution of essential oil mixture and propaganda among the people for popularising anticholera inoculation. In Fyzabad the juniors constructed the model of a sanitary village for demonstration to the public and of a bore-hole latrine for the education of school children. Other activities included the celebration of health and Red Cross weeks in certain places, personal cleanliness campaigns and participation in flood relief work in the affected areas.

The number of district centres of the St. John Ambulance Association was 22 at the end of 1938. Including 900 men of the police force, a total of 3,472 men was trained during the year and granted the certificates of the Association. The Mackenzie School Course certificate was granted to 6,920 men.

Health education of the people was carried on by the members of the public health department on the usual lines. A publicity van equipped with health exhibits, loud speakers, cinema films and gramophone records toured in 28 districts, covering an area of 7,789 miles and gave demonstrations to a population of nearly 146,000. A health exhibition was arranged in connection with the *Kumbh mela* at Hardwar and smaller exhibitions were held at various fairs and festivals in different parts of the province.

New propaganda material prepared by the Hygiene Publicity Bureau included leaflets on cholera and typhoid fever, a story issued as a pamphlet dealing with the evils of drink and an article entitled " Your child's food and eating habits ", which was issued in Urdu and Hindi for the use of Junior Red Cross groups in the province. A new cinema film on plague and another describing the arrangements for the Hardwar festival were also prepared.

In Bengal there are 12 units equipped with health films for touring in the districts. Their tours are arranged by district officers in consultation with the local people. It is stated that 1,605 demonstrations were held during the year. In addition an exhibition van also worked for five months in different parts of the Province.

In Bombay Presidency health propaganda was carried out by the Bombay Presidency Baby and Health Week Association, the Sanitary Associations of Broach, Ahmedabad and Bombay, the Maternity and Infant Welfare Association, Sholapur, and the branches of the Red Cross Society. The usual methods of health education of the people were employed and it is reported that a large section of the community came within the range of these activities.

The Karachi Health Association, the Red Cross Society and the Junior Red Cross are the voluntary organisations which take an active part in health propaganda in Sind. The Provincial Public Health Department also carried on health education on the usual lines and, in addition, health stalls were organised in connection with a number of agricultural and other exhibitions. Malaria and tuberculosis received special attention, leaflets and pictorial posters being extensively used for educating the people. The Government allotted Rs. 15,000 for the construction of model villages and an equal amount for rural reconstruction work and for propaganda.

Health propaganda, which is one of the routine duties of the public health staff in Orissa, received considerable attention during 1938 and it is reported that talks on various health subjects were delivered in 9,795 villages and in almost all the towns of the province. The total audience is reported to have been in the neighbourhood of 800,000. In addition, eight health exhibitions were held in Ganjam district and two in Balasore district.

The Health and Baby week was celebrated in many centres in the district of Ganjam and at one centre in Koraput district and a gratifying feature of these events was that the different departments of public administration participated in the celebrations. During the last quarter of the year a travelling health unit, equipped at a cost of Rs. 4,000, toured in the district of Balasore and carried on propaganda against the use of opium. In the district of Cuttack it is reported that health units were organised in 12 villages on a voluntary basis and that these organisations took an active part in health education.

In the Central Provinces health education was carried out in rural areas by subassistant health officers at all the schools and villages which they visited, by delivering lectures with the aid of coloured charts and pamphlets on various health subjects.

In Madras Presidency production of propaganda material has been centralised in the office of the Director of Public Health, where a health officer is in charge of this work. One hundred and eleven leaflets and pamphlets and 24 posters on different subjects have so far been issued. In 1938 a set of 37 posters on maternity and child welfare, entitled "Sita and Nagamma" was prepared in the form of a story and issued in all the languages of the province, as well as a set of 24 health maxims in Tamil and three coloured bookmarks on "Food and Nutrition". In addition four cinema films, a set of magic lantern slides on rural reconstruction and some health models were purchased and added to the stock of propaganda material available for loan to local authorities and voluntary organisations engaged in health propaganda.

The District Boards of Nellore, Cuddapah, Chittoor, Coimbatore, Guntur, Godavari East, and Tanjore maintained mobile propaganda units equipped with cinema machines and magic lanterns, which toured in their respective areas.

Since the opening of a broadcasting station at Madras by the All-India Radio, the Public Health Department participated in the broadcasting programmes by contributing short talks on public health subjects. During the year, 27 talks were given.

A health week was celebrated in most of the districts and municipalities in the province and intensive propaganda was carried out during the week. The Public Health Department participated in the All-India Khadi and Swadeshi Exhibition at Congress House held from the middle of December 1938 to the middle of January 1939.

It is reported that in Assam health propaganda with the aid of magic lanterns was carried out by the Assistant Surgeons of the Public Health Department in the course of their inspection of dispensaries. The subjects dealt with included general sanitation and food as well as the common infectious diseases such as malaria, kala-azar, tuberculosis, smallpox, leprosy. and cholera. The expenditure was partly met from the public health budget and partly from the King George Thanksgiving (Anti-Tuberculosis) Fund.

Food Adulteration.

36. Food adulteration in India presents certain special problems. Its control is vested in provincial governments and, as the Food Adulteration Acts in the provinces were mostly enacted with but limited consultation among provincial authorities, the standards fixed for individual articles of food vary widely. Further, uniformity of laboratory practice does not exist in the provinces so that the results of the analyses of the same article of food in different laboratories are not likely to be quite comparable. In consequence of these facts the enforcement of the provincial Food Adulteration Acts has impeded the free flow of interprovincial trade in certain important articles of food such as ghee. Another aspect of the problem is that local authorities are responsible for administering the Acts within their areas and that no active efforts are being made by these authorities to enforce the provisions of law in the absence of a strong public opinion against the sale of adulterated food. Prosecution of every case of adulteration and the infliction of deterrent punishments on the offenders by the magistrates can alone put down the evil practice. Undue leniency in regard to both exists in most parts of the country. Under these circumstances it is a matter for gratification that the whole question of food adulteration is under investigation by a special committee of the Central Advisory Board of Health and that as the result of the recommendations made by the Board, it may become possible, at no distant date, to attempt to secure uniformity in respect of standards, of laboratory technique and of legislative and administrative methods, which should go a long way towards a more efficient control of adulteration throughout the country.

From the administrative point of view control of food adulteration does not appear to present the obstacle of lack of funds, which impedes progress in most fields of public health activity. While the procedure may not be the same in all provinces, in some the public analyst under the Act is maintained by the provincial Government and contributions towards the total expenditure are recovered from the local authorities by the Government. Local bodies are permitted to retain the money recovered as fines from the persons convicted of offences under the Act and it is known that the amount that the local authorities realise from this source exceeds, in many cases, the money they have to pay to the provincial Government. Under existing conditions a strict enforcement of the Act need not therefore be a financial burden to the local bodies. This and other aspects of the problem will no doubt receive attention from the Food Adulteration Committee of the Central Advisory Board of Health and its report may be expected to provide an illuminating survey of existing conditions and of the changes necessary for tightening control over food adulteration.

The work done in the provinces during 1938 for controlling food adulteration is summarised below :—

It is reported that, in the N.-W. F. Province, the Punjab Pure Food Act and the rules framed under this Act by the provincial Government were in force in 1938 in all the municipalities and notified areas. One hundred and twentyfive samples of ghee were examined in the provincial laboratory and of these 42 per cent were found to be adulterated. Of 70 samples of milk which were examined 29 per cent were shown to be adulterated.

The chemical laboratory maintained by the Public Health Department of the Punjab carries out the analysis of articles of food and drink in connection with the enforcement of the Punjab Pure Food Act for the large majority

of the local authorities which have adopted the Act. As may be seen from the following figures, within recent years a considerable increase has taken place both in the number of municipalities working the Act and in the number of samples sent for analysis.

	No. of local bodies which have the Government Public Health Chemist as the Public Analyst.	No. of samples examined.
Up to 1936 . . .	39	209
During 1937 . . .	64	865
During 1938 . . .	96	1,143

Of the 1,143 samples examined during the year under review, 788 were of ghee, 171 of milk and 18 of butter. These products together formed 85·5 per cent of the total number of samples examined. The percentage of adulteration in samples of ghee was as high as 65·2. This figure, as pointed out by the Director of Public Health, exaggerates to some extent the prevalence of adulteration because samples are collected mainly from suspicious sources. Nevertheless the figure is sufficiently high to justify the assumption that adulteration of this important article of food is widely practised in the Punjab.

Although a noticeable increase has taken place in the number of samples sent by local bodies for analysis, the Director points out that there is considerable room for improvement as is evidenced by the fact that 66 out of the 96 local bodies, which have the Government Public Health Chemist as their analyst, either sent a fewer number of samples than 10 or none at all during the year.

Twelve local bodies maintained their own analyst and a total number of 2,971 samples of different articles of food was examined by them during the year. The percentage of adulteration is reported to be 37.

The Punjab Pure Food Act is in force in Delhi Province and the Chief Health Officer reports that the Act worked satisfactorily during the year under review. The articles of food to which sampling was confined were milk, ghee and butter. In the combined areas of New Delhi, Delhi city and Civil Lines, 2,971 samples of milk, 822 of ghee and 30 of butter were examined during the year, the percentages of adulteration being 17·2, 36·6 and 33·3 respectively.

During 1937 considerable opposition was offered by the traders to the enforcement of the Act. In 1938 much of this opposition disappeared partly because an agreement was reached that first offenders should be warned and given an opportunity to stock better ghee and partly because graded and tested ghee became available to the merchants. On the other hand the Chief Health Officer states that the fines imposed by the courts were not sufficiently heavy to prove deterrent to the sellers of adulterated ghee and this explains the fact that the percentage of adulteration in 1938 showed no improvement over that for the previous year.

The improvement of the milk supply of Delhi urban area requires a strict enforcement of the Act as well as arrangements for the provision of a supply of pure milk on which the public can rely. Only in this way can the unscrupulous *gowala* be forced to recognise the necessity for improving the quality of his own milk. A step in this direction was taken during the year by the initiation of a scheme for the supply of good milk with the collaboration of Messrs. Keventers, Ltd. From the point of view of public health it is to be hoped that the scheme will also help towards raising the standard demanded by the public in the methods of production of milk and that this will lead to the elimination of the nuisance now associated with the insanitary cow-byres in Delhi.

In the United Provinces the number of samples of food analysed has grown steadily during the past few years. In 1934 the total number of samples received by the Public Analyst was 6,448 and by 1938 the number had risen to 11,210. Excluding some samples which were received in a state unfit for analysis and others which were analysed for purposes other than those of the Food Adulteration Act, of 11,012 samples examined 20·6 per cent were shown to be adulterated.

The application of the Food Adulteration Act was extended in 1938 to three notified areas, three towns, the Magh *Mela* area of Allahabad and certain bazars and fairs in the rural areas. During the year the Act was in force in 85 municipalities, 42 notified areas, 17 cantonments, two festival centres and several towns and villages in 39 districts.

The number of persons prosecuted under the Act was 2,104 and of these 1,342 were fined, the average amount of fine being nearly Rs. 41. It is reported that the punishment awarded by many magistrates was sufficiently heavy to be deterrent while others imposed fines as low as Rs. 5, a figure too small to prove a hardship to the vendor of adulterated food.

The butter, ghee and fat licensing rules for preventing the sale of vegetable product as genuine ghee are stated to be in force in 51 areas. The Government have advised all local bodies to adopt these rules.

In Bengal the number of samples received for examination by the Government public health laboratory decreased from 12,123 in 1937 to 9,114 in 1938. This is due to the fact that the establishment of two laboratories by the district boards concerned was permitted by the Government and these laboratories served the districts of Jalpaiguri, Birbhum and Bankura. Further, the district boards of Nadia and Murshidabad, in anticipation of being able to establish similar district laboratories, withheld the despatch of their samples to the Government laboratory. Of the various articles of food examined mustard oil, ghee and milk formed large proportions. The percentages of adulteration for these articles were 35·7, 59·4 and 74·6 respectively in district board areas and 15·6, 45·9 and 53·3 in municipalities.

The Public Health Institute maintained by the Government in the Central Provinces examined 15 samples of butter, 32 of ghee, one of khowa and five of tea. All the samples of butter were found to be adulterated as well as 34·4 per cent of the ghee samples while an equal percentage of the latter were shown to be rancid and unfit for human consumption. All the tea samples were genuine but the single sample of khowa was adulterated.

Separate public analysts worked in the municipalities of Nagpur and Jubbulpore and they examined 766 samples of ghee and 513 of milk.

The Bombay Prevention of Adulteration Act was in force during 1938 in the towns of Bombay, Ahmedabad, Surat and Broach. The following figures show the numbers of samples of different articles of food examined and the percentages of adulteration.

	Milk.		Ghee.		Butter.		Other articles.	
	No. of samples.	Percentage of adulteration.	No. of samples.	Percentage of adulteration.	No. of samples.	Percentage of adulteration.	No. of samples.	Percentage of adulteration.
Bombay	6,744	17	1,754	3	862	10	946	49
Ahmedabad*	2,236	Not available.	190	Not available.	8	Not available.	Not available.	Not available.
Surat	39	25	40	30	...	...	...	...
Broach	69	84	36	22	...	...	...	...

* The percentage of adulterated samples was 35.

In Sind the number of samples examined under the Food Adulteration Act has shown a steady increase from 1,211 in 1934 to 5,054 in 1938. The Act was in force during 1938 in the municipalities of Karachi, Shikarpur, Hyderabad, Tatta and Sukkur. In December 1938 its operation was extended to the town of Larkana but no samples were taken for examination before the end of the year. The percentage of adulteration in samples of milk varied from 58·9 in Sukkur to 26·1 in Karachi and in ghee and butter together from 47·5 per cent to 19·5 respectively in the same two towns.

During 1938 the operation of the Food Adulteration Act was extended to 12 municipalities and 9 panchayats in Madras Presidency. At the end of the year the Act was in force in the areas of 90 local bodies including Madras city. Madras city has its own Public Analyst while the samples from all the other local bodies in the province are analysed by the Government Analyst at the King Institute, Guindy. During the year 1936-37, 7,972 samples were analysed compared with 7,017 during the previous year. These included 1,317 samples examined in Madras city. The numbers of samples examined for different articles of food and the percentages of adulteration are given below for the period from 1st October 1936-37 to 30th September 1937-38 :—

Nature of the sample.	1936-37.		1937-38.	
	Total No. of samples.	Percentage of adulteration.	Total no. of samples.	Percentage of adulteration.
Ghee	1,962	34·4	2,108	34·1
Butter	368	38·3	368	40·2
Milk	2,844	59·4	3,407	51·3
Gingelly oil	1,214	9·1	1,255	13·0
Other samples	629	20·3	834	17·4
Total for the year	7,017	39·1	7,972	36·7

There is but little variation between the two years in the percentage of adulterated samples in respect of the different articles of food. The Public Analyst points out that, although the average fine imposed by the magistrates has increased from Rs. 22 to Rs. 27 the fines continue to be, in a number of cases, too small to have any deterrent effect on the defaulters. On the other hand, from the financial point of view, he states that the enforcement of the Act is a sound proposition for the local bodies. Of the 90 local authorities enforcing the Act, 64 recovered through fines more than their contribution to the Government compared with 51 during the previous year. Six municipalities recovered thrice their contribution and 29 local bodies (25 municipalities and four panchayats) twice their contribution.

Adulteration of ghee is a problem presenting considerable difficulty in all parts of the country. On this question the Madras Public Analyst has made some interesting remarks. In that province the ghee merchants made representations to the Government that arrangements should be made for samples of ghee to be certified as genuine on nominal charges. While this is impossible in view of the fact that no simple tests are available for testing the genuineness of ghee, the Analyst points out that the main fault lies in the fact that ghee merchants do not generally make any efforts to ensure that the butter from which they make ghee is unadulterated. The price paid for the butter is in many cases too low to secure the genuine article. Secondly there is urgent need for the organisation of the trade on sound lines. Butter for the manufacture of ghee is generally purchased through agents who obtain

the supplies from the villages. Adequate supervision of the preparation of butter through reliable agents in the villages should be arranged by the Ghee Merchants' Association. Cooperative societies or groups of merchants can help towards the organisation of properly conducted dairies and production of clean milk and milk products in the rural areas adjoining cities. Such efforts are essential for supplementing the working of the Food Adulteration Act if an improvement of the existing condition is to be achieved. These remarks apply equally to other parts of India.

The public health laboratory in Assam examined, during 1938, 547 samples of different articles of food. Of these 56·5 per cent were found to be adulterated. The number of samples of ghee was 222, of milk 96 and butter two. Of the last both were adulterated, while the percentages of adulteration in ghee and milk samples were 72·1 and 53·9 respectively.

Housing.

37. Improvement of housing in urban and rural areas is one of the most urgent and difficult of the health problems of this country. The subject was discussed at some length in the 1936 report and the main lines of advance for improving housing conditions in cities, towns and in the rural areas were briefly indicated. Progressive industrial concerns have shown, within recent years, a desire to provide their employees with suitable quarters, although little or no progress has been made in the inauguration of comprehensive schemes in which the provincial Government, local authorities and employers of labour all participate as suggested by the Royal Commission on Labour in India. Brief notes regarding improvements in the housing of factory labour in the provinces are given later. As regards the general population mention may be made of a scheme for Delhi urban area which has recently been introduced by the Improvement Trust with financial assistance from the Government. In the following paragraphs is given such information as is available regarding housing in the provincial public health reports.

In the Punjab, it is reported that town planning schemes in unbuilt areas have been prepared for two towns, Lahore and Lyallpur, but that little progress has been made in their application. An Improvement Trust has been created in Lahore and standards have been established by that body for regulating and controlling the layout of areas and the construction of buildings in these areas. Model byelaws for the regulation of buildings have been issued by the provincial Government for adoption by the larger towns.

In Delhi province mention has already been made of a slum clearance scheme by which rehousing of the poor is to be effected. It is proposed that the dispossessed slum dwellers should be given the opportunity of acquiring their own houses on a system of instalment payments extended over a period of 20 years.

In the United Provinces, it is reported, that the Municipal Board of Cawnpore provided quarters for about 700 sweepers. In this city there are many insanitary and overcrowded areas known as *ahatas* which lack adequate lighting and ventilation and are unfit for habitation. Small rooms are let out on exorbitant rents and about 40,000 people reside in these *ahatas*. It is reported that the Municipal Board has a scheme for the gradual acquisition of the *ahatas* and for improving or re-modelling them on sanitary lines. A Slum Clearance Joint Committee has been set up by the Municipal Board and the Improvement Trust for the purpose of carrying out improvements in these areas. In 1932 there were 216 such *ahatas*, and, of these, it is stated, that 66 have so far been improved.

In regard to the rural areas it is reported that, through the combined efforts of the rural health staff and the rural development organisation, about 20,000 ventilators have been provided in village houses and that 108 houses have been rebuilt on modern lines.

In Bengal a little over three million people live in urban areas and the remaining 47 millions in rural areas. The Director of Public Health considers that the housing conditions in both these areas are extremely unsatisfactory and that the most important requirement is the provision of legislation for village planning and for small town planning. The results of an enquiry regarding the housing conditions in district board areas showed that no improvement trusts, building societies or organisations for promoting housing schemes for the industrial population existed in the rural areas of the province. The Director emphasized the necessity of all municipalities adopting suitable building byelaws and of enforcing them.

In Bombay Presidency small urban housing schemes were carried out in a number of places. Thus Manmad municipality demolished the insanitary houses of *Mahars* and *Mangs* and allotted to them new plots of land for the erection of quarters. In Bassein and Vile Parle sanitary *chawls* were provided for *Bhangis*. Barsi municipality provided Rs. 1,000 for improving the housing condition of the depressed classes. The Surat municipality is providing Rs. 8,000 every year for the construction of quarters for the employees of the municipality belonging to the depressed classes.

It is reported that, in the province, after the Town Planning Act was passed some years ago, 51 schemes relating to an area of nearly 16,000 acres have been prepared and 38 schemes involving about 7,766 acres have been carried out. Town planning schemes were prepared in Ahmedabad, Bombay Suburban district and Poona. Other activities in this field of health administration included the sanctioning of house sites, in a number of areas, to members of the backward classes.

Progress in regard to rural housing has been slow. There are 25 house reconstruction societies and all of them are stated to be in Ahmedabad district. Owing to the inability of the members, who are mostly agriculturists, to repay their loans, the activities of these societies have been restricted.

It is stated that no improvement trusts exist in any of the towns of Sind and that no industrial housing schemes are in progress. The Karachi Port Trust, the N. W. Railway and the Karachi Municipal Corporation have provided a number of quarters for their employees on the lower scales of pay. Karachi municipality has framed a set of building rules and it is reported that no plans for new buildings are approved unless they conform to these rules. It is also stated that a policy of opening up congested areas and improving narrow streets and roads has been followed by this municipality. Cooperative housing societies exist in Shikarpur and Dadu.

As regards the rural areas a special officer has been appointed by the Government for rural reconstruction and in every district committees have been formed with the Collector as chairman. These committees have prepared programmes for rural development, which include the building of model houses in selected areas.

The Madras Public Health Act of 1939 makes comprehensive provision for the improvement of housing conditions in the province. The following are some of the most important provisions : (*i*) reservation of areas for residential purposes, (*ii*) control over insanitary buildings, (*iii*) abatement of

overcrowding, (*iv*) prohibition of occupation, in urban areas, of new buildings until adequate water supply and sufficient means of drainage have been installed, and (*v*) enforcement of the provision of sanitary conveniences in buildings intended for human habitation.

The Government have framed rules for the control of building sites and for the construction of wells, house drains, cess pools, septic tanks and latrines connected with septic tanks. These rules are for the guidance of municipal authorities in regulating the construction of houses in their areas.

The Local Boards Act and the Madras Town Planning Act provide power to the provincial Government to extend any of the provisions of the Madras City Municipal Act, Madras District Municipalities Act, or the Madras Town Planning Act to any of the local areas, with or without such modifications as the Government may consider necessary. Advantage has been taken of these provisions and the Madras District Municipalities Act and Town Planning Act, in so far as they relate to buildings, have been extended to certain panchayats. During 1937-38 the Town Planning Act was enforced in 139 towns.

Many building cooperative societies exist in the province and the formation of new societies is being encouraged by the Government by advancing loans to them.

In Assam no building societies or cooperative schemes for the improvement of urban or rural housing existed during the year under review. On the other hand it is reported that in industrial centres housing conditions are improving. The Director of Public Health suggests that local bodies should demonstrate to the people in selected areas how, by simple experiments such as those of clearance of rank vegetation from the compound and keeping houses and their immediate surroundings clean, a great deal can be done by the people themselves to improve the existing state of affairs.

Industrial housing.

In the United Provinces 454 quarters (307 single and 147 double) were constructed during 1938 by factory owners for their employees. Sugar factories were responsible for the majority of these houses. In Madras it is reported that the owners of many textile mills and tea factories provided housing accommodation at a nominal rent to their employees. The Mettur Industries, Ltd., in Salem district constructed 720 quarters at very low rents, while Mettur Workshops in the same district also provided quarters for the workers. Houses for which the rent does not exceed 10 per cent of the salary of the individual have been provided for the use of the officers and staff of the South Indian Railway workshops at Trichinopoly. These quarters number 3,426. The Chittavalsa Jute Mills, Chittavalsa, have provided 515 houses for their workers, the Buckingham and Carnatic mills, Madras, 487, the Nellimerla Jute Mills 398, the Trichinopoly Mills, Ltd., 266, and the Madura Mills 166. A sum of Rs. 20,000 has been provided by the Basantha Mills, Singanellur, Coimbatore district, for the construction of quarters for their workers.

The industrial housing scheme of the Bombay Government in Bombay city consists of 207 *chawls* of reinforced cement construction, each of which contains 80 rooms. These have been provided at four different centres in the city. At each centre shops have been provided and arrangements have also been made for the provision of water taps in the rooms on payment by the tenants of an additional charge of Rs. 2 per month. It is reported that the sanitation of the *chawls* is well looked after. Maternity homes and creches have been provided by certain voluntary organisations. The Municipal Corporation has provided schools at all the centres and a dispensary at one of them.

The number of workers living in these *chawls* is stated to be over 63,000. In Ahmedabad it is reported that the municipality was building 156 quarters for industrial labour. The Asbestos Cement Factory carried out certain improvements in the housing schemes controlled by the factory.

It is stated that, in Bengal, no marked advance was made in the conditions under which factory labour lived during 1938 compared with the previous years, although in 20 factories additional accommodation was provided and in some cases unsatisfactory houses were replaced by more substantial ones and amenities such as tube wells, water hydrants and bathing places were provided.

In Assam the tendency during the past few years has been to replace the houses constructed of flimsy material by more permanent structures and this continued during the year. The Tarapore Tea Co., Cachar, reconstructed 423 thatch houses of an improved type for their workers. The Burma Oil Co. Ltd., has constructed improved types of houses for the different grades of their employees, drainage, water supply, sanitation and electric light also receiving attention.

Except for a few large factories housing conditions for industrial labour in the Punjab remained unsatisfactory and it is stated that no improvement can be expected until factory legislation has been extended to cover housing.

In Sind, the Dalmia Cement Works and the Sind Cement Works have provided a number of quarters for their employees.

In the Central Provinces, Delhi and the N.-W. F. Province, it is reported that no new housing schemes were undertaken by factory owners but that quarters already in existence were well looked after. No further progress in housing schemes was reported from Ajmer-Merwara, Bihar and Orissa.

Industrial Hygiene and Health of the Industrial Population.

38. The average number of operatives employed in the factories in British India increased from 1,675,869 in 1937 to 1,737,755 in 1938, which is the highest figure recorded so far. Marked increases took place in Bombay (43,896), Madras (7,705), the Punjab (2,795), Bihar (2,565), Assam (2,152), Sind (2,024) and U. P. (1,601). An increase in the number of women employed in factories was recorded during the year, the respective figures for 1937 and 1938 being 232,122 and 240,932. The percentage of women to the total factory population was 13·8, the same as in 1937. On the other hand, the percentage of children to the total factory population showed a slight decrease from 0·64 per cent to 0·62 per cent. Bombay was the only province in which there was an appreciable increase in the number of children employed, the figures being 943 in 1938 and 466 in 1937. In Bengal three prosecutions were instituted for the employment of children without the requisite medical certificates, and one for the employment of an under-aged child.

The number of accidents increased from 28,323 in 1937 to 33,494 in 1938. The incidence of all accidents per 100,000 operatives rose from 1,559 in 1937 to 1,927 in 1938. Generally speaking, it is stated that the increase was due to the influx of untrained men in the industries and to better reporting.

The health of factory employees in all the provinces is reported to have been generally good. No epidemics took place except in C. P. and U. P. where a few outbreaks of cholera were reported. The sanitary arrangements in the factories were on the whole satisfactory. In Bengal, in many factories controlled by the smaller municipalities drainage and sewerage

facilities were unsatisfactory. In Bombay Presidency the problem of a satisfactory disposal of trade waste in Ahmedabad municipality remained unsolved. Improvement in the sanitary condition of many mofussil concerns in the province is reported. In U. P., complaints regarding the disposal of the effluent from sugar factories were less numerous than in the previous year. The supply of drinking water to factories was generally adequate and of good quality.

Welfare works of various types were reported from the different provinces. These included the provision of extra hospital accommodation for employees, provision of amenities such as sports clubs, libraries and reading rooms, provision of canteens for the use of workers, the establishment of creches and the appointment of welfare officers for the investigation of complaints made by factory labour, the creation of a better understanding between workers and their employers, and other matters concerning the general welfare of the industrial population.

Mines.

The daily average number of persons working in and about the mines regulated by the Indian Mines Act during 1938 was 306,260 compared with 267,858 in the previous year. The former figure is the highest on record, an increase of 10·6 per cent over that for the previous year. Of the toal number employed in mines, coal mines accounted for 201,093 or nearly 66 per cent. Women were excluded from working underground in the coal mines during the year. Brief remarks regarding the health and sanitation of the areas under the control of the Asansol Mines Board of Health and the Jharia Mines Board of Health are given below :—

Sickness amongst the miners in Asansol was, it is reported, at the lowest level in January and February and reached the maximum in July and August, declining thereafter till the end of the year. Of 387 attacks of cholera, 142 were reported from collieries, 37 from municipal towns and 208 from rural areas. The incidence rate in collieries was 2·0 per thousand, while that in the villages was 0·78. The higher rate of incidence in the collieries was due to the migration of labour from outside the mining settlement and constant movement of labour from mine to mine in search of work. It is reported that adequate control measures were taken under the Cholera Regulations, the total number of inoculations carried out being 35,382. The number of smallpox cases reported during the year was 87. During the past few years strenuous efforts have been made to get the population of the mining settlement protected by mass revaccination. The number of revaccinations performed during the previous five years was 308,777, while the number of children and adults primarily vaccinated was 77,086.

The number of maternity and infant welfare centres maintined by the Board of Health increased from 7 to 9. Each is in charge of a health visitor and a daily average of 235 infants and 136 toddlers attended the morning clinics at the centres. Of 121 *dais* trained during the year, 69 passed the examination conducted at the end of the course. A total of 1,494 cases of confinement received skilled attendance.

The medical arrangements which existed at the collieries were overhauled and unqualified men were replaced by registered practitioners. Provision for in-patients has been made at many collieries.

A considerable amount of antileprosy work was carried out during the year. The number of leprosy officers increased from four to five and 30 trained assistants were employed for survey, propaganda and home visiting. The Leprosy Relief Association organised the usual annual leprosy day and the collection made on that occasion amounted to Rs. 14,988 against Rs. 11,330 in 1937. It is reported that arrangements have been made to construct a leper settlement near Asansol for segregating leper beggars and highly infectious cases from collieries and villages. A survey made during the year revealed an incidence rate of 1·6 per cent among the general population and of 2·3 per cent among the students of primary schools.

Intensive antimalaria operations were carried out in four areas and a partial campaign was undertaken in six other areas with a view to stimulating local effort by the residents themselves. The measures adopted included cleansing of tanks before the malaria season, treatment of breeding places by spraying and filling in wherever possible, and a supply of larvicidal fish to private wells.

A tuberculosis survey extending over a period of six months was carried out among a group of miners and retired miners with a view to finding out the incidence and nature of the infection.

The estimated population of the settlement of the Jharia Mines Board of Health was 561,090 persons. The death rate was 16·3 per thousand compared with 16·5 during the previous year. There were 86 cases of cholera with 30 deaths of which five took place in the collieries. A total of 10,232 anticholera inoculations was performed. During the year 378 cases of smallpox took place with 19 deaths. Samples of food analysed in the Board's laboratories totalled 454 and prosecutions were ordered in respect of all cases of adulteration. The five year housing scheme started by the Board in 1937 continued to make progress. The Dhanbad and District Leprosy Relief Fund was in charge of antileprosy work in the settlement. A leper day was organised and a sum of Rs. 9,125 was realised. A new clinic was opened at Telmucho raising the total number of clinics to five. During the year 704 new patients were treated in the different clinics, the total number of treatments given being 30,259.

The Jharia Water Board functioned throughout the year, the total quantity of water supplied being 535,000,000 gallons.

A considerable amount of health propaganda was carried out in the year, the principle subjects being leprosy, maternity and child welfare, general hygiene, sanitation, dietetics, vitamins and temperance.

Railways.

39. The Central Advisory Board of Health had suggested the formation of local committees on which the civil, railway and military health authorities were represented, for the carrying out of cooperative measures in matters of common concern. Local committees have been formed in many places and it is reported that progress in the formulation of suitable schemes is being achieved. The periodical meetings of the Board, at which provincial Directors of Public Health and the representatives of the railway and military health administrations are present, provide valuable opportunities for mutual consultation while the Public Health Commissioner, in his capacity as the Secretary of the Board, is able to render help towards coordinating the efforts of these authorities in the pursuit of their common objects.

Railway health authorities have consistently shown a desire to cooperate with the civil health departments in the enforcement of sanitary measures in connection with fairs and festivals. Much of the success achieved during recent years in the prevention of outbreaks of cholera at largely attended festival centres must be attributed to such cooperation. Railway administrations have, in addition, shown increasing interest in antimalarial measures and in the development of maternity and child welfare work. Brief notes on the working of individual railway health departments are given below.

North Western Railway.

The Railway administration maintained during 1938-39 seven divisional hospitals and 64 other hospitals and dispensaries with a total of 529 beds. Of the chief diseases treated 80,370 were cases of malaria, 12,481 trachoma, 10,154 influenza, 9,258 dysentery, 632 enteric fever, 476 tuberculosis of the lungs, 363 other forms of tuberculosis, 256 gonococcal infection, 243 smallpox, 214 syphilis, 143 cataract and 86 cholera. Three hundred and fortyone cases of normal and 47 cases of abnormal labour were conducted.

The average number of employees constantly absent from duty on medical certificate was 13 *per mille* of the average strength of the staff and the average number of days an employee was absent from duty was 4·6.

In connection with the Hardwar *Kumbh mela* in 1938, medical inspection posts were established in cooperation with the provincial and State health authorities at Khanalampura, Saharanpur, Ambala Cantonment, Delhi, Bhatinda, Ludhiana and Amritsar. Special sanitary arrangements were made at Saharanpur, including improvement of the water supply and the provision of additional latrine accommodation for passengers. Among the pilgrims returning from Hardwar 38 cases and five deaths from cholera were reported. Immediate action was taken to bring the disease under control. The total number of pilgrims who travelled by the N. W. Railway to Hardwar was approximately 355,000. Apart from this *mela* provision of medical and sanitary arrangements was made in connection with 18 other festivals in different places. The total number of pilgrims who visited these festival centres is estimated to be in the neighbourhood of 245,500.

As an antimalarial measure experimental spraying of selected staff quarters at certain stations was carried out with " Pyrocide 20 ". The results obtained are reported to have been encouraging.

Other activities included training in first aid of 515 candidates and of nine in home nursing under the auspices of the St. John Ambulance Association. Ambulance divisions were maintained at Moghalpura, Lahore and Ferozepore and a nursing division at Moghalpura. They are reported to have done good work in connection with accidents at workshops, railway stations, sports meetings and at Saharanpur in connection with the Hardwar *Kumbh mela*.

Eight child welfare centres and three subcentres were maintained during the year. The total expenditure was approximately 23,000.

An antirabic treatment centre was opened at the Lahore railway hospital on 1st September 1938. Supplies of antirabic vaccine were obtained from the Pasteur Institute, Kasauli. One hundred and sixtytwo cases consisting of employees and the members of their families were given antirabic treatment during the year.

Bombay, Baroda and Central India Railway.

The total number of cases treated during 1938-39 by the Railway Medical Department was 378,449. These included 21 cases of enteric fever, 14,937 of influenza and 77 of rheumatic fever. Only one case of cholera took place during the year and plague was absent. Smallpox cases numbered 148 and deaths 11. The total number of working days lost during the year by the subordinate staff and menials, who numbered 62,224, was 399,107, and the average period covered by a certificate of sickness was 6·8 days.

Free dental service to menials and at a reduced cost to the subordinate staff was provided by granting facilities to six qualified dentists to work in railway hospitals and dispensaries and by giving them free passes for travelling on the Railway.

Antimalarial measures such as clearance of rank vegetation, regular inspection of potential breeding places and spraying with malariol, filling of pits and sealing of unused wells were carried out at a number of railway stations. The numbers of malaria cases among the staff during the past few years are shown below :—

	Primary cases.	Relapsing cases.
1936-37	7,900	8,900
1937-38	9,182	8,197
1938-39	8,512	8,693

It is stated that, during the past two years, oleander plants have been planted at several stations to absorb waste water and that the effect of this experiment on the breeding of mosquitoes is being investigated.

Thirtynine classes in first aid were held during the year against 32 during the previous year, and of 397 persons who underwent training, 207 obtained certificates, 24 vouchers, two medallions and five labels. A class in Mackenzie School course and three classes in home nursing were also held.

Madras and Southern Mahratta Railway.

During the year 1938-39 no case of plague occurred among the railway population while the numbers of attacks from cholera and smallpox were 27 and 100 respectively. The Chief Medical Officer points out that, of the 100 cases of smallpox, the majority took place among employees and their dependents living outside railway colonies. As the Railway runs through territories which have, in many places, wide prevalence of these three diseases the Chief Medical Officer claims that the preventive work of the railway medical staff is largely responsible for the low incidence of cholera and smallpox and for the absence of plague.

Antimalarial measures were carried out at 45 stations. With the cooperation of the Engineering Department most of the potential breeding places at many of these stations were either filled in or rendered easier to control by canalisation and other structural alterations. In several instances the help of local health officers and of other officials was obtained for the carrying out of antimalarial measures. Considerable success in the control of malaria appears to have been achieved by these measures. It is stated that the total number of malaria cases treated in the year just prior to the starting of the malaria operations was 9,246 and that the number of days lost by the staff on account of attacks of malaria was 11,209. In 1938-39 the corresponding figures were 845 and 3,022 respectively.

In regard to general sanitation and hygiene, constant supervision and inspection by the medical staff, travelling sanitary inspectors and sanitary inspectors at larger stations were carried out throughout the year, in order to maintain a desirable standard of efficiency.

A scheme for the medical examination of school children which was inaugurated in January 1938 worked satisfactorily. Parents however showed, in certain cases, inability or unwillingness to arrange for proper treatment. For instance, it is reported that parents pay more attention to advice regarding provision of spectacles than to advice regarding change of diet.

Training in first aid continued as in previous years and during 1938-39 the number of persons trained was 552 compared with 433 in 1937-38.

The leprosy clinic which was opened in 1936, continued to work during the year under review. Since the starting of the clinic 167 employees and 76 dependents have been treated for the disease. It is stated that about 51 per cent of the 167 employees have become non-infective as the result of treatment and that, as all the patients will continue to be under observation by the railway medical administration till the term of service of each employee is over, the risk of the spread of infection has been greatly inimised.

South Indian Railway.

A total of 38,125 cases was treated in the hospitals and dispensaries of the railway during the year under review. The number of cases of infectious disease included in this total was 16,281. Influenza accounted for 5,980 cases, dengue for 54, rabies 54, cholera two, smallpox 12 and cerebrospinal fever three cases. Plague was absent.

Antimalarial work in the Shencottah Ghat section was extended for another year. The Travancore health authorities cooperated with the railway administration in these measures and it is reported that the scheme has been of great benefit to the staff there.

In regard to water supply the filters at Golden Rock in Trichinopoly were overhauled, a water works supervisor was appointed and it is reported that the quality of the water is satisfactory. The filtered water supply at Erode, which is also subsequently chlorinated, is stated to be of good quality. In regard to a number of stations whose supplies required improvement, negotiations were in progress with the Patterson Engineering Company regarding the feasibility of automatic chlorination.

As regards venereal disease a scheme of treatment has been working for some time in order to induce the patients to undergo treatment voluntarily while remaining at work. For syphilis the scheme has met with but limited success as the number of patients availing themselves of the treatment is smaller than had been expected. As regards gonorrhœa, treatment with M. and B. 693 appears to hold out the hope of getting the patients back to work in about 10 days instead of the previous period of two months.

The Chief Medical Officer's report summarises the results of an investigation for five years into the incidence of chronic bacillary and amœbic dysentery as a cause of persistent ill-health in that part of the country. It is stated that "a large proportion of the chronic illnesses, especially those with symptoms of any sort connected with the abdomen, are really dysenteric in nature". The majority of the cases which used to be diagnosed formerly as debility, indigestion, chronic diarrhœa, sprue, rheumatism, piles, etc., are stated to be

cases of chronic dysentery. Flatulence and a sore tongue may be attributed, it is stated, to a superadded streptococcal infection. In quite a number of cases the investigation showed that V W Y and X Z Flexner groups were present and sometimes a Shiga infection was also present. The position may be further complicated in some patients by an amœbic and a secondary streptococcal infection. The inadequacy of routine treatment for such patients is emphasised and certain methods of treatment are indicated which are stated to have produced good results.

Great Indian Peninsula Railway.

The number of patients among the employees treated at the medical institutions maintained by the Railway in 1938-39 was 1,26,348 and among the families of the employees 86,430. Corresponding figures for 1937-38 were 1,15,322 and 77,905 respectively. Increases in incidence were recorded under malaria and other fevers such as influenza and enteric fever. The prevalence of malaria was high during June to October, the highest incidence being reached in October (1,233 cases) while the smallest figure was reached in February (371 cases). The usual antimalarial measures for the systematic destruction of larvæ and for the prevention of mosquito breeding were carried out throughout the year. Special measures were undertaken in Bhusaval to control breeding on the outskirts of the railway colony. Influenza was prevalent on the line throughout the year and the total number of cases reported was 7,886 compared with 7,634 in the previous year. The number of employees treated for enteric fever was 119 and for tuberculosis of the lungs 164. Cholera was responsible for 179 cases, plague eight cases and smallpox 297 cases. The numbers of protective vaccinations carried out against cholera, plague and smallpox were 35,419, 638 and 52238 respectively. The total number of persons given antirabic treatment at the railway centres was 360 compared with 340 during the previous year.

The Bhusaval infant welfare and maternity centre continued to do useful work. An additional centre was opened at Manmad in May 1938. The expenditure on these centres was met from the Staff Benefit Fund.

Forty first aid classes were held during 1938 and 280 persons obtained certificates, eight vouchers, three medallions and one obtained a label. A course of A. R. P. lectures was held in Bombay and a batch of six railway employees underwent training, of whom four obtained the instructor's certificate.

East Indian Railway.

The total number of cases treated during the year under review was 95,939, a decrease of three per cent compared with the figure for the previous year. Sporadic cases of infectious diseases occurred at different places but no serious outbreak was recorded. Attention is drawn, in the report of the Chief Medical Officer, to the prevalence of tuberculosis among the staff and their families. For a limited number of persons assistance is given by grants from the Staff Benefit Fund for treatment in different sanatoria. For others long leave is granted in order to give them facilities for rest and adequate treatment.

The antimalarial campaigns conducted at Barwadih, Lillooah, Tatanagar and on the Lhaksar-Dehra Dun Section are stated to have reduced the incidence of the disease in these highly malarious areas.

Small clinical laboratories have been provided at several hospitals and dispensaries and, in addition, the Central Laboratory at Allahabad carries

out the examination of a large number of samples of water and articles of food as well as of pathological and bacteriological specimens from patients sent from different stations on the railway.

Since July 1938 the workshops at Lillooah and Jamalpur have each been placed under the charge of a workshop medical officer who is able to devote greater attention to the health and welfare of the labour population employed at these workshops.

Eastern Bengal Railway.

The total number of railway employees treated during the year was 1,36,102 and of the members of their families 64,210. Of the total 7,299 cases were due to influenza, 13,182 malaria, 4,377 dysenteries, 98 enteric fever, 155 venereal disease, 76 smallpox, 21 cholera, 96 kala-azar, 81 tuberculosis, 20 leprosy and 237 helminthic infections. The average number of days of certified sickness wss 6·7.

In 14 stations antilarval measures were carried out within a radius of half a mile around the railway colony while in 17 other stations these operations were confined to the railway limits. In seven other places quinine and the new synthetic drugs of atebrin and plasmochin were employed for controlling malaria. It is stated that various public bodies asked for the cooperation of the railway authorities for the institution of antimalarial measures in the areas adjacent to the railway colonies and that full cooperation was accorded in all such cases. Two monthly returns are maintained, *viz.*, (*i*) malaria parasitological record containing the name of every positive case of malaria and (*ii*) a return showing the number of malaria cases in every station. Weekly returns are also kept giving details of antilarval measures.

During the year first aid courses were arranged for 343 persons and home-nursing training for 19 women.

Bengal and North Western Railway.

Malaria is reported to be the most important disease among the population of this railway, the sections most affected being Katarnianghat, Jarwa and Bhiknathoree. At the last place, where shingle quarrying was in progress, the incidence of epidemic malaria was so serious and the mortality so high that it was difficult to keep the labour population at their work. Distribution of quinine mixture and of cinchona febrifuge tablets was extensively carried out for prophylactic and curative purposes and similar measures were carried out at the other two places also. In Bihar the incidence of malaria was complicated by the presence of kala-azar infection also.

A large number of anticholera inoculations was carried out in connection with limited outbreaks in several places.

Owing to the prevalence of plague in Gorakhpur and Benares districts a number of stations in these districts became infected. Antiplague inoculations were carried out as well as disinfection of houses and rat destruction by cyanogas, for which the district health staff of Gorakhpur cooperated with the railway authorities.

The average daily attendance at the railway maternity and child welfare centre was 38. A baby show was organised and 300 children competed in the show. The children of those railway employees who were drawing salaries below Rs. 50 per month were given milk, food and other nourishment, a total amount of Rs. 400 being spent for the purpose. The maternity staff conducted 18 cases in the colony and admitted 148 labour cases into hospital.

First aid training was given at Gorakhpur and Benares, three men having qualified themselves at the end of the course at the former and 26 at the latter.

Assam Bengal Railway.

The number of patients treated during 1938-39 in the hospitals and dispensaries maintained by the railway administration was 100,546. Including the dependents of the employees there occurred 12 cases of cholera and four cases of smallpox. Other infectious diseases which occurred were enteric fever (73 cases), mumps (70), chickenpox (61), measles (126), diphtheria (11) and kala-azar (70). Preventive vaccinations for cholera, smallpox and enteric fever numbered 5,921, 107 and 846 respectively. Antirabic treatment was given to 91 patients.

As regards malaria it is stated that some improvement in its incidence has been recorded in the controlled areas of Pahartali and Lumding. The Staff Benefit Fund continued to provide a midwife at each of the stations of Pahartali, Lumding and Badarpur. These midwives attended 150 cases.

Courses of lectures in first aid were given throughout the year and 163 persons passed the examination held during the year.

Bengal Nagpur Railway.

The report on the health administration of this railway during 1938-39 records many improvements. All the sanitary inspectors were placed under the direct control of the Chief Medical Officer and refresher courses for these men were started in order to improve the standard of work in connection with environmental hygiene. A joint circular was issued by the Chief Engineer and the Chief Medical Officer to the executive officers of both departments with regard to the selection of sites for quarters and the execution of future developmental schemes. A chemist was appointed in order to carry out the analyses of water supplies and waste waters from railway settlements. A new type design for septic tank latrines was devised jointly by the Engineering and Medical Departments.

Malaria control operations were carried out during the year at 46 stations. Measures against Stegomyia were in progress throughout the year in Waltair near Vizagapatam, the monthly indices for the railway area ranging between 0·0 in November 1938 and 1·1 in April 1938.

An outbreak of cerebrospinal fever took place in the Tata mines at Noamundi during March 1939. It is reported that prompt measures were taken and that no cases occurred among the railway staff.

The number of in-patients treated in the railway hospitals during 1938-39 was 3,715. A qualified dentist visited the hospitals at Khargpur, Adra and Bilaspur and treated 135 patients.

The laboratory at Khargpur carried out a large amount of work, including the examination of clinical specimens from the hospitals and dispensaries maintained by the railway company, preparation of vaccines and water analysis.

Special arrangements were made for the *Rath Jatra* and *Dol Jatra* festivals at Puri.

SECTION V.

INTERNATIONAL HEALTH AND PORT HEALTH ADMINISTRATION.

Office International d'Hygiene Publique, Paris.

40. As usual two meetings of the Permanent Committee were held. The spring session, which was held from 9th to 18th May, was attended by Colonel A. J. H. Russell, C.B.E., K.H.S., I.M.S., as the delegate for India.

The usual procedure of transacting business through Commissions was followed and the delegate for India was appointed a member of five of these, *viz.*, the Quarantine, Air Navigation, Yellow fever, Cholera and Opium Commissions.

The Quarantine Commission examined several questions relating to (*i*) the application of Article 28 of the International Sanitary Convention, 1926, which provides for the six monthly deratisation of ships, (*ii*) measures applicable in the case of cholera, (*iii*) vaccination and measures against smallpox, (*iv*) sanitary declarations on the arrival of ships and the point raised by the delegate for India in respect of the interpretation of Article 100 of the International Sanitary Convention regarding pilgrim ships. The observations of the Commission in regard to these are contained in the following sub-paragraphs (*i*)-(*iv*) :—

(*i*) As regards the application of Article 28 of the International Sanitary Convention, 1926, the Commission supported the recommendation of the Consultative Council of the Singapore Bureau that " strict attention should be paid to the application of Article 28 ". This recommendation was based on the fact that a considerable number of ships arrived in Eastern ports with deratisation certificates dated more than seven months previously.

The Commission emphasised the importance of the inspection of ships and of periodical deratisations being carried out efficiently. The Commission also pointed out that the certificates issued should be as full and explicit as possible. An enquiry carried out in British ports showed that the proportion of ships which were found to have some degree of rat infestation did not exceed ten per cent and that only about one per cent were heavily and persistently rat infested.

This enquiry revealed that some of the causes of rat infestation were controllable, such as rat harbourage in wharves and inefficient deratisations. In regard to ships in which the results of deratisation were unsatisfactory the Commission suggested an increase in the concentration of gas and, within the limits prescribed by Article 28 of the Convention, in the period of exposure. As regards the deratisation of loaded vessels the Commission remarked :—

" Even in cases where the ship, at the expiration of the regulation period, calls at a port where it is not discharging its cargo, or only discharged a necessary part, and does not proceed at once to its ' home port ', it would appear preferable (in the absence of special circumstances pointing to a contrary course) to allow it to continue its voyage to a port where, after unloading, inspection and, if necessary, deratisation, can best be carried out ; a note to this effect should be entered on the certificate carried by the ship."

The Commission reiterated its view that periodical deratisation should not, save in exceptional circumstances, be imposed more often than is required by the Convention.

(*ii*) The question of measures against cholera arose from the fact that extraordinary measures were taken by the Mexican Government against Japanese ships on the ground that cholera existed in Japan and that there was danger of its spread to Mexico. The Commission expressed the opinion that whatever measures were adopted, they should not be maintained after the disappearance of the disease in the country of origin and that "in any case it seems that a strict and rational application of the precautions prescribed against cholera in the Convention affords an effective protection against the disease without having recourse to additional measures, due regard, naturally, having been paid to local requirements in ports authorised for disembarkation, etc.".

(*iii*) The Commission considered a recommendation of the Consultative Council of the Singapore Bureau, *viz.*, that all passengers embarking in a port infected with smallpox should be required to produce proofs of immunity against smallpox before being able to obtain a ticket. The Commission held that, although it would be in the interests of the passengers to be vaccinated before leaving a port infected with smallpox, it was not necessary to lay down general rules of practice and that any precautions which might be considered justified should preferably be based on local conditions.

(*iv*) The delegate for India raised the question whether the provisions of Article 100 of the International Sanitary Convention, 1926, which provides minimum accommodation standards for pilgrims on board ship, were applicable to very young children. The Commission, subject to any final opinion which might be pronounced by the Pilgrimage Commission at the October 1938 Session, expressed the view :—

(1) that as regards the application of the International Sanitary Convention, children, irrespective of their age, making the pilgrimage, are pilgrims ; and

(2) that they need the same cubic space of air on board as adults, the more so since they cannot move about in the open air as adults can, and that it seems to be necessary to allot them all the space required by the Convention.

The Quarantine Commission for Aerial Navigation considered *inter alia* the question of declaration of origin for passengers coming from regions infected by, or suspected of, yellow fever. The Commission, having studied a form of declaration prepared by the Pan-American Sanitary Bureau for air passengers by which they furnish information regarding the place of origin of their voyage and the places where they have stayed during the six days preceding embarkation, considered that, since the International Sanitary Convention, 1933, provides that passengers can be subjected to medical examination, air navigation companies would be acting wisely in providing passengers with forms of this kind at the time of embarkation.

The Commission was informed by the delegate for India of the arrangements made with the Egyptian Sanitary, Maritime and Quarantine Board to send telegraphic communication to the Air Port Health Officer at Karachi concerning all passengers proceeding to India from infected or suspected yellow fever areas, and a notification by radio from arriving aircraft to the Air Port Health Officer at least two hours prior to its arrival at Karachi. He further informed the Commission of the reciprocal arrangement made between

the health authorities in India, Iraq and Egypt by which the health authorities in India are informed of the carriage by aircraft of any suspected passengers coming from a yellow fever area, and those of Iraq and Egypt are appraised by the Indian public health authorities of any passengers leaving India by aircraft from areas infected with cholera and smallpox.

The Yellow Fever Commission considered (1) the value of the mouse protection test for the diagnosis of yellow fever, (2) the risk of persons recently vaccinated passing on the amaryl virus, (3) the use of prophylactic vaccination against jungle yellow fever, and (4) control of the vitality of yellow fever vaccine, post vaccination immunity and the duration of this immunity. In regard to the use of the test for retrospective diagnosis the following points were stressed by the Commission, (1) it has value when a positive reaction is obtained on patients, after recovery and after a sufficient interval has elapsed, provided these patients gave negative results before the illness, (2) for diagnosing an epidemic of doubtful nature the test is valuable only " if the number of cases giving a positive reaction is definitely greater than the average of positive cases in the surrounding population ". As regards the risk of recently vaccinated persons passing on the virus, the available evidence shows that the strain 17D used in Brazil is a very much attenuated form of the virus, that it is stable and non-reversible and that it has not been possible to transmit the virus by mosquito bites. This virus, which is cultivated on embryonic tissue, does not require the addition of immune serum.

For jungle yellow fever the Commission considered that vaccination *en masse* with the new vaccine, 17D, appeared to be the only practical method of prophylaxis.

As regards vaccination the Commission recorded that it agreed with the Rockefeller Foundation " in recommending that each lot of vaccine, before being used, should be subjected to the vitality test and its virulence should be graded ". The Commission also recommended that, as far as possible, vaccinated people should be tested for immunity after the lapse of a month at the earliest. The Commission was unable to give a ruling regarding the duration of immunity.

The Cholera Commission considered the following communications :—

(1) A note by Colonel J. Taylor, Director, Central Research Institute, Kasauli, entitled " Further observations on the value of ' O ' agglutination in the diagnosis of the *V. choleræ* ".

(2) A paper by the President of the Commission on laboratory experiments on the comparative agglutination reaction and the properties of sixty culture vibrios, including a certain number of El Tor cultures, in the presence of antisera prepared with pure antigen ' O ' of the strains Ogawa, Inaba and Napoli.

(3) Three communications by Dr. De Vogel regarding a cholera epidemic in the Dutch East Indies which was apparently caused by the El Tor vibrio.

Colonel Taylor's note emphasised the fact that the " H " antigen of the cholera vibrio was common to all types of vibrios found in water and that no vibrio of a type other than an " O " group I can be held responsible for a cholera epidemic. However, as regards the application of the appropriate preventive measures, Colonel Taylor stated that action should be taken as soon as suspected cases of cholera appear without waiting for the isolation of a typical ' O ' agglutinable vibrio.

The President of the Permanent Committee gave details regarding the laboratory experiments carried out under his guidance for finding out the best method of preparing a pure 'O' antigen of the cholera vibrio. Four methods were tried on three known strains of the organism, Inaba, Ogawa and Napoli. The methods were heating, 0·5 per cent lithium chloride, 0·01 per cent phenol and 0·5 per cent alcohol. It is stated that the lithium chloride method was shown to be superior to the other methods in the elimination of the "H" antigen.

Dr. De Vogel described an epidemic of clinical cholera which had occurred in the Celebes Islands in the Netherlands Indies. From 80 typical cases of cholera a vibrio was isolated which belonged to the El Tor type. This was confirmed by the Central Research Institute, Kasauli, in respect of certain cultures which were sent to that Institute. These findings are of great importance to health authorities as the El Tor vibrio has not hitherto been recognised as a choleragenic organism and a comparative study of the epidemic and of the bacteriological observations is expected to yield valuable results.

The delegate for India presented the following papers at this session :—

(1) Colonel J. Taylor's note on "Further observations on the value of 'O' agglutination in the diagnosis of *V. cholerœ*".

(2) Dr. A. C. Ukil's note on "Tuberculosis in India".

(3) A note on the work on kala-azar in India during the last three years, by Lt.-Col. H. E. Shortt, I.M.S.

(4) A note on "The rôle of the sandfly in the transmission of kala-azar" by the Director, School of Tropical Medicine, Calcutta.

(5) Colonel Russell's note on "The distribution of quinine in India".

(6) A note on "Bacillary dysentery in and around Calcutta", by Bt.-Col. R. N. Chopra, I.M.S.

(7) A note on "History of a case of post vaccinal encephalitis in the Punjab", by Lt.-Col. C. M. Nicol, I.M.S.

(8) Colonel Russell's note on "Mental hygiene in India".

(9) Dr. K. C. K. E. Raja's paper on "A forecast of population in India at the census of 1941".

(10) A paper on "The population problem in India", by Lt.-Col. A. J. H. Russell, I.M.S. and Dr. K. C. K. E. Raja.

(11) A note on "The progress of nutrition work in India", by Dr. W. R. Aykroyd.

The autumn session of the Permanent Committee was held from 17th to 26th October and was attended by Lt.-Col. C. M. Nicol, I.M.S., as the delegate for India.

The delegate for India was appointed a member of the Quarantine Aerial Navigation, Pilgrimage, Yellow Fever, Cholera and Opium Commissions.

The Quarantine Commission for Aerial Navigation considered a proposal made by the Director, Eastern Bureau, League of Nations, Singapore, that aircraft might be required to send a wireless message before their arrival in the first airport of a country giving information regarding the sanitary condition of the crew and passengers. The Commission felt doubtful whether the principle that aircraft should send such a message could be accepted unreservedly and observed that in any case there could be no question of an obligation to do so. The Commission drew attention to Article 15 of the

International Sanitary Convention for Aerial Navigation, 1933, which lays down that the Commander of the aircraft should, as far as he is able, notify the aerodrome of arrival if he wishes to disembark a sick person. At a previous session the Commission had considered the question of the " declaration of origin " which passengers coming from specified regions in America and South Africa fill up before their departure and which must be presented by them at the airport of arrival. The Commission considered that some procedure of this kind, which does not interfere in any way with air travel, might be recommended in the circumstances in question.

The Cholera Commission, having studied the communications from the delegates of British India and the Dutch East Indies on the vibrio of the El Tor type which was regarded as the cause of an epidemic exhibiting the clinical characteristics of cholera which occurred in the Celebes, expressed the opinion that neither the El Tor vibrio nor the non-agglutinable vibrios can be considered to have the same significance as the true cholera vibrio of Koch. However, the Commission considered that " Where epidemiological information or clinical symptoms cause a choleriform syndrome to be suspected and still more when such a diagnosis can be made, steps should be taken to apply the sanitary measures prescribed. In particular, the pilgrimage should be declared infected even if Koch's vibrio is not found in carriers or patients, but only the El Tor vibrio or non-agglutinable vibrios ". On the other hand the mere discovery of the El Tor vibrio or non-agglutinable vibrio, without epidemiological evidence or the clinical symptoms of cholera, does not justify the application of sanitary measures and the pilgrimage should be declared clean. The presence of Koch's vibrio in a healthy carrier and more particularly in a sick person requires the immediate enforcement of sanitary measures and the declaration of the pilgrimage as infected.

The Yellow Fever Commission approved of the relaxation of sanitary measures in respect of persons vaccinated against the disease. While the immunity following an attack of yellow fever was recognised to be of long duration the Commission considered that no definite conclusions can be reached regarding the duration of immunity resulting from vaccination against the disease. With regard to the immunity shown to exist in certain domestic animals which had not suffered from yellow fever or been exposed to the infection, the Commission considered that " for practical purposes no conclusion can be drawn from these experimental tests as regards the specificity of tests on man ".

The delegate for India presented seven papers including three on cholera vibrios isolated from water and other non-human sources, from the Central Research Institute, Kasauli, the Pasteur Institute, Shillong, and the School of Tropical Medicine, Calcutta ; one entitled " Epidemiological note on cholera in India during 1938 " by Dr. K. C. K. E. Rāja ; a note by Colonel J. Taylor, I.M.S., suggesting that further information should be collected regarding the cases of clinical cholera reported from the Celebes in which the El Tor vibrio was regarded as the causal organism, one on rheumatism in India, by Col. Stott, I.M.S., and one on cancer in India.

Singapore Bureau, League of Nations, Health Organisation.

41. The work of the Eastern Bureau in 1938 was mainly concerned with the collection and dissemination of epidemiological information, the distribution of documents relating to health matters received from various sources to the health administrations of the countrie adhering to the Bureau, participation

in the work of promoting the health measures recommended by the Rural Hygiene Conference, Bandoeng, in August 1937, such as health surveys, anti-tuberculosis campaigns and nutrition research, and the holding of an international course in malariology.

Arrangements were made by the Bureau with Eastern health administrations to have particulars supplied to the Bureau of the quarantine measures to be applied by each country against the ports which it declares infected with a specific disease. This information is transmitted by air mail and through broadcasts to the authorities of the countries concerned.

The fifth international course in malariology started in Singapore on 25th April and was completed on 20th May 1938. Eighteen medical graduates representing the countries of Australia, British India, Indo-China, Malaya, Netherlands India, Philippine Islands and Thailand attended the course. The programme of studies at Singapore was followed by a field study for a period of ten days, in the State of Selangor, of the practical application of control measures.

Health Organisation of the League of Nations, Geneva.

42. The work of the special Commissions appointed by the Health Organisation to investigate the problems of nutrition, housing and physical education was briefly reviewed in the 1937 report. The work accomplished by these Commissions in 1938 is briefly summarised below.

The programme of studies for the Technical Commission on Nutrition for 1938 and 1939 included the investigation of nutrition in Asia and tropical countries generally and the formulation of the methods to be employed for quantitative and qualitative surveys of the nutritional state among the people. While recognising that the standards laid down by the Commission regarding the physiological basis of human nutrition were universally applicable it was felt that these standards might represent the ultimate goal and that the obvious necessity was to raise the existing diets to a level " not beyond the limits of practical possibility, but, at the same time less remote from the optimum standard ". In regard to the Far East and tropical countries, there was need for fuller information regarding dietary habits, the nutritional value of local foods and the incidence of diseases associated with dietary deficiencies. In order to coordinate the activities of various institutions concerned with nutrition research in the East it was decided to negotiate for the services of the Coonoor Nutritional Research Laboratories of the Indian Research Fund Association as a liaison centre between these institutions and the Technical Commission.

A valuable contribution to the study of nutrition in human communities has been made by a book published under the auspices of the Health Organisation, which is entitled " Guiding Principles for Studies on the Nutrition of Populations ". It was prepared by Professor E. J. Bigwood of the University of Brussels and was examined in detail by a special committee which met in August 1938. Four types of diet survey are described and three different forms of enquiry into the state of nutrition of populations, which were recommended by a group of experts in December 1936, are also included in this book. In addition a considerable amount of useful information has been incorporated, such as the factors to be taken into consideration in establishing the physiological value of the diet, the computation of energy value and protective principles in the diet and the statistical significance to be attached

to the results of surveys since the investigations would necessarily cover only a portion of the community. The author also devotes attention to methods dealing with latent hypovitaminoses and iron deficiency.

The Housing Commission mainly concerned itself with the problem of insolation and illumination and with rural housing and planning. A committee of experts called by the Commission to investigate the questions relating to insolation and illumination met in August 1937 and again in June 1938. The report of the experts is a valuable document * bringing together all the available knowledge on the subject. " It sums up the results of research into the thermal, visual, physiological, psychological and bactericidal effects of radiation from the sun and the sky and defines human needs in this respect in the light of present knowledge ". The report also deals with the methods of utilising this knowledge for the insolation and illumination of human dwellings by paying attention to " the orientation of buildings, fenestration, the space between buildings, building materials and the necessity for open spaces in the shape of gardens, recreation grounds, playing-fields, swimming-pools etc.".

In regard to rural housing and planning an important contribution has been made by a report prepared by M. M. Vignerot, Chief Engineer of the Service du Genie rural of the French Ministry of Agriculture. This report is entitled " Rural Housing and Planning " and it deals with the construction of rural dwellings and their outhouses with due regard to the requirements of health, comfort and convenience to the work of the agriculturist and his wife. It also deals with the organisation of communal life in the village, and questions of water supply, electricity, gas and disposal of sewage and refuse in rural communities and on isolated farms are also discussed.

As regards physical education the Health Committee called together, in July 1938, a Committee of Rapporteurs for examining the results of the research work so far carried out on the physiological effects of physical exercise for the purpose of formulating rational bases of physical education, for planning a further programme of research and for preparing a list of tests for physical fitness based on bodily measurements and functional efficiency. The Rapporteurs emphasised the desirability of physical exercise being taken under medical supervision and expressed the opinion that the aim of physical education " should not be to develop champions but to benefit the whole community ". Suggestions were also made regarding the proper distribution of physical exercise during the day, during the week and in relation to meals. A programme of research was drawn up in order to provide information in regard to various aspects of the problem. This programme included physiological, anthropometric and psychological research so as to throw light on such questions as the effects of physical exercise on the functions of the body, the specific effects of different types of exercise at different ages, the characteristics of athletic types in different countries and the relationship between intellectual and physical development.

In order to standardise medical examination in different countries a provisional form was drawn up by the Committee and was forwarded to health administrations and various institutions interested in physical education for their comments.

* Bulletin, Health Organisation, 1938, Vol. VII, 581.

Indian delegation to the 19th (Ordinary) Session of the Assembly of the League of Nations held from the 12th to the 30th September, 1938.

43. The Indian delegation consisted of Sir Nripendra Nath Sircar, K.C.S.I. (Member of the Executive Council of the Governor-General), Leader of the Delegation, Sir Sultan Ahmed and Sir Shanmukhan Chetty, K.C.I.E., (Dewan of Cochin State). Mr. W. D. Croft, C.I.E., C.V.O. (Secretary Economic and Overseas Department, India Office) acted as substitute delegate.

The main work of the assembly was distributed as usual among seven committees. The Indian delegation was represented on all these committees. The Seventh Committee considered questions relating to health such as housing and nutrition.

Sir Sultan Ahmed drew a comprehensive picture of the work being done in India in connection with nutrition. His remarks are summarised in the following extracts from the Report of the Indian Delegation :—

"The question had been elaborately considered by the Royal Commission on Agriculture presided over by the Marquess of Linlithgow a few years ago, and nutrition in the East was examined in detail by the first Inter-Governmental Conference held under the auspices of the League in 1937 at Java. The Conference emphasised the great severity of the problem of nutrition in the East. Most of the general recommendations of the Conference had been anticipated by the Government of India. The two main recommendations were the establishment in each country of (*a*) a National Nutrition Committee, and (*b*) a Central Nutrition and Research Institute.

Such recommendations were unnecessary for India because the Nutrition Advisory Committee of the Indian Research Fund Association, established some time before, was to all intents and purposes a National Nutrition Committee, and the well-staffed nutrition laboratories at Coonoor, which were financed by the Indian Research Fund Association and had been in existence for many years, constituted a central institute for nutritional studies.

The Health Organisation Technical Commission on Nutrition had undertaken, at the request of the Assembly, to devote a large part of its attention from 1938 onwards to the problem in Eastern countries. To assist in the programme of work, the Health Committee had proposed that the Nutrition Research Laboratory at Coonoor should act as a coordinating liaison centre for Eastern countries, and it was understood that the suggestion had been taken up direct with the Indian Research Fund Association.

The Health Committee at its Twentyseventh Session also recommended that the Technical Commission should be increased by the addition of two new members representing the East, Dr. Aykroyd, Director of the Nutrition Research Laboratory, Coonoor, and Professor Van Veen of the Netherlands Indies.

In accordance with a recommendation by the Assembly of 1935, the Government of India had called for information on measures taken by local Governments to obtain improved nutrition. The replies had been collated by Dr. Aykroyd and forwarded to the League.

At the research laboratory at Coonoor, under Dr. Aykroyd, data had been collected on deficiency diseases, vitamin standards and analyses of foodstuffs. Other aspects of the problem were being tackled in coordination with the Coonoor laboratory by Dr. Wilson of Calcutta. Such work was of the highest importance not only for India but for Eastern countries as a whole. It included research into the nutritional state of the people and into available foodstuffs and practical application of the results ; experiments on the value of milk as a supplement to diets ; special training classes for provincial workers at Coonoor ; coordination of agricultural research and the requirements of human nutrition (a liaison officer had already been appointed in India as a result of Sir John Russell's recent Report) ; and the issue of health bulletins and propaganda in other forms.

The problem was essentially one which each country must solve for itself ; but the opportunities afforded by Geneva of comparing results and achievement in the different countries were an inestimable advantage which he hoped would be exploited to the full."

"The Government of India attaches the greatest importance to health questions. Indeed, no Government worth the name could overlook the necessity of taking every possible step to improve the health and welfare of one-fifth of the population of the whole

world. Sir Sultan Ahmed trusted that the Committee would appreciate that great progress had been made in the theoretical study of health questions and, what was more, that practical effect had been given to all decisions arrived at after mature consideration to improve the health of the vast population in India by all possible means, in rural as well as urban areas.

In so saying, he was under no delusion. An advance had been made, but it was only a beginning. The problem was vast. But given goodwill and cooperation on the part of all concerned, the expectations aroused by initial success might, he hoped, in time be fully justified."

First International Congress of Leprosy.

44. This Congress was held in Cairo (Egypt) from the 21st to the 27th March 1938. Arrangements were made for holding the Congress by the Egyptian Government on the initiative of the International Leprosy Association.

Colonel Russell attended this Congress as the delegate of the Government of India whilst Drs. J. Lowe and Isaac Santra attended as the representatives of the Indian Council of the British Empire Leprosy Relief Association and Dr. R. Row represented the Bombay Branch of the British Empire Leprosy Relief Association. Other delegates from India included (1) Dr. R. G. Cochrane of the Lady Willingdon Leper Settlement, Chingleput, South India, (2) Dr. H. H. Gass of the Leper Asylum, Chandkuri, C. P. and (3) Mr. A. D. Miller, Secretary for India of the Mission to Lepers. Altogether 60 countries were officially represented.

Four sub-Committees were appointed to deal with and report on (1) the classification of leprosy, (2) the treatment of leprosy, (3) the epidemiology and control of leprosy, (4) in vitro cultivation of *M. Leprae*. Of the delegates from India Dr. Lowe was appointed a member of the first, Dr. Gass of the second, Colonel Russell, Dr. Santra and Mr. A. D. Miller of the third, Dr. R. G. Cochrane being the secretary of this Committee.

The following papers were read by delegates from India :—

(1) A preliminary report of a statistical survey of leprosy in a rural area of Bengal, by Dr. J. Lowe.

(2) A clinical study of leprosy in South India, with special reference to children, by Dr. R. G. Cochrane and Dr. M. Paul Raj.

(3) Observations on the results of the medical and surgical treatment of the complications in leprosy by Dr. H. H. Gass.

(4) Propaganda, treatment and survey method of antileprosy campaign in India, by Dr. I. Santra.

(5) Complement fixation test in the treatment of leprosy and its significance in the pathogenesis and treatment of the disease ; by Dr. R. Row.

The plenary session of the Congress adopted the following resolution :—

" That the Congress, while appreciating to the full the work of voluntary organisations in antileprosy work, wishes to emphasise strongly its opinion that the control of leprosy is essentially the responsibility of the Governments of the countries where the disease is common and that antileprosy work should form an important integral part of the public health programmes of such countries. It is also urged that Governments should do everything possible to initiate and encourage research with a view to improving methods of leprosy control."

Third International Congress of Tropical Medicine and Malaria.

45. This congress which was held at Amsterdam (Holland) from 24th September to 1st October 1938, was attended by Lt.-Col. G. R. McRobert, I. M. S. and Dr. I. M. Puri as the delegates of the Government of India. It was arranged between them that whilst Dr. Puri would attend the malaria section, Lt.-Col. McRobert would devote attention to the other sections of the Congress.

Sir Robert McCarrison, late Director of Nutrition Research, Coonoor (India) opened the discussion on nutrition and deficiency disease by reading a paper entitled " A general historic survey and account of deficiency diseases in the tropics ". During the discussion the desirability of studies on mineral deficiencies in the tropics was stressed. In view of the fact that, in some parts of the tropics the indigenous population is fed entirely on the vegetable products of a limited area, it was suggested that more attention should be paid to studies in mineral metabolism. The delegate for India, Lt.-Col. McRobert, mentioned the occurrence of endemic fluorosis in the Madras Presidency as an example of a disease caused by abnormal amounts of minerals in the food and drink and explained that this disease, although it must have existed from the beginning of time, had only been recently recognised and fully described.

The new chemistry and isolation of Vitamin B_1, and the control of beri-beri were also discussed, and the possibility of having legal enactments made to compel the addition of the new and cheap synthetic vitamin B_1 to vitamin deficient articles of diet in beri-beri areas, was considered. Lt.-Col. McRobert suggested that before governments were approached in the matter, some of the major commercial firms might be invited to try out the effect of the synthetic commercial vitamin B_1 on a mass scale. Dr. Aykroyd's paper which emphasised the serious deficiency of calcium in South Indian diets was well received.

The U. S. A. delegate made an important contribution on the rôle of nicotinic acid in human nutrition. He explained how following the administration of sufficient quantities of nicotinic acid to a pellagra patient in relapse there was a spectacular healing of the mucous membrane lesions, blanching of the skin esions, clearing of the mental symptoms and improvement in general wellbeing.

In the Filaria Section, much interest was shown in the *Filaria malayi* and in the peculiar methods of control required for the elimination of Mansonioides which depends on the presence of the growth of Pistia.

The contribution of Dr. F. L. Soper of the Rockefeller Foundation in Brazil on vaccination against yellow fever with virus 17 D was received with great interest. Reference was made in this paper to over half a million persons inoculated in Brazil with a modified yellow fever virus.

Dr. Puri concludes his report as follows :—

" Prof. Swellengrebel, the President of the Third International Malaria Congress in winding up the deliberations on the morning of Friday, 30th September, remarked that in spite of very strong distractions a fair amount of work had been achieved during the present Congress. We had, he said, come to the definite conclusion that (1) an extra cellular stage in the life history of the malaria parasite did exist ; (2) that anti-adult and antilarval measures should both be carried out to effect proper malaria control. He deplored that house-spraying as an antimosquito measure had not been tried in other countries besides South Africa and India and remarked that this was most probably because this measure was still in an experimental stage."

Port Health Administration.

Port of Bombay.

46. Vessels totalling 928 (117 incoming and 811 outgoing) were examined by the Port Health Department. Of the incoming vessels 65 were infected whilst one was declared infected while in the harbour. There were 28 cases of chickenpox on these incoming infected vessels and one case on a vessel lying in the harbour, 14 of jigger, three each of acute pneumonia, mumps and scarlet fever. Fourteen intending passengers and members of the crew were not allowed to sail as eight of them were found to be suffering from chickenpox and six from measles. Twentytwo passenger contacts of these cases were also prevented from sailing. In addition two cases of leprosy, 15 of undiagnosed fever, four of scabies, one of whooping cough and one of influenza amongst passengers and three cases of venereal disease among the crew were rejected by the ships' surgeons. Necessary precautions were taken in respect of all passengers. The numbers of persons inspected were, on incoming vessels 53,120, on outgoing vessels 110,079 and on vessels in harbour 28. The clothing, bedding and other personal effects of 50,711 members of the crew and passengers in outgoing and incoming vessels and of members of the crews of vessels lying in port were disinfected. In addition, 43,668 coolies and stevedores were inspected before being allowed to go on board ship to work cargo.

The Havero Trading Co. entered into a contract with the Government of India in April, 1938, for a period of two years for the fumigation of vessels with hydrogen cyanide. The inspection and, if necessary, fumigation of coastal vessels and harbour and country craft was initiated. Twentythree coastal vessels and 169 harbour and country craft were inspected. Of these 142 were granted exemption certificates and 50 were fumigated.

Seventyfour deratisation and deratisation exemption certificates were issued, the numbers of ships deratised by sulphur and cyanide fumigation being 40 and 18 respectively whilst the number of ships which qualified for exemption certificates was 16.

Measures to prevent the ingress of rats to vessels in the harbour were taken by the Bombay Port Trust.

The inspection of provisions for lascar crew was carried out by the Port Health Department. During the year 1938, 540 such inspections were carried out.

The sanitation of the port area was supervised by an administrative medical officer employed by the Bombay Port Trust. Antirat and anti-mosquito measures were also carried out by this medical officer.

During the pilgrim season of 1937-38, thirteen pilgrim ships carrying 7,131 pilgrims sailed from Bombay. Before embarkation, all pilgrims were medically examined as usual and all dirty bedding and clothing likely to have been exposed to infection or infested with body vermin were disinfected before embarkation. Vaccinations against smallpox and inoculations against cholera were carried out. As regards inward pilgrim traffic, 19 pilgrim ships with 7,495 pilgrims on board arrived, and on three of these, six cases of infectious diseases were found on arrival. All pilgrim ships were inspected on arrival.

Port of Karachi.

A total of 108 vessels including 16 pilgrim ships and 3 country craft arrived in quarantine. The total number of passengers and crew examined on them

was 24,743. There were ten cases of chickenpox, one of measles, three deaths from acute pneumonia and 29 deaths from non-infectious diseases reported on these vessels. Outgoing vessels which were granted bills of health totalled 877. Altogether 52,852 passengers and crew sailing by steamers and 6,048 passengers and crew sailing by country craft were inspected. In the course of medical examination seven cases of smallpox, four of chickenpox and two of measles were detected.

It is reported that during 1938 no outbreak of epidemic disease of a serious nature occurred on any vessel entering or leaving the Port of Karachi or during its stay there. Karachi city was free from cholera and plague during the year while smallpox occurred in a sporadic form, the highest number recorded in one week being six.

Antimosquito measures were carried out under the supervision of the Port Health Officer in the harbour area and in the adjoining Port Trust estate, by a medical officer trained in antimosquito work and a staff who are maintained by the Port Trust for this purpose. A total of 14,129 vessels were inspected including fishing craft, lighters, launches and other harbour vessels.

Rat destruction operations were carried out throughout the year on the barges and jetties. A total number of 4,233 rats is reported to have been killed by trapping and baiting. None of the rats examined during the year are reported to have been found infected with plague. Eight ships were granted deratisation certificates and 12 ships were granted deratisation exemption certificates.

During the pilgrim season of 1937-38, 14 pilgrim ships sailed from Karachi. Of these, five sailed direct from Karachi and the remainder called at Karachi *en route* from Bombay and, after embarking passengers from Karachi, sailed for Jeddah. A total of 11,821 pilgrims embarked at Karachi. As regards inward pilgrim traffic 16 ships arrived at this port and disembarked 12,095 pilgrims. The total number of deaths on these incoming pilgrim vessels was 32 and all were from non-infectious diseases. All pilgrims were inoculated against cholera and smallpox before they set out on their pilgrimage and no case of these diseases occurred among them.

The provision and stores for the use of the Asiatic crew of 36 ships were inspected. Of the 90 samples of ghee examined only three were reported to be non-genuine.

Karachi Airport.

All east-bound aeroplanes are inspected on arrival by the Health Officer. The number of these aeroplanes during 1938 was 317 and they carried 1,234 passengers and 1,323 members of the crew. During the year, the Quarantine Board in Egypt, cooperated in sending telegraphic messages in the case of all passengers coming from yellow fever infected areas. All these passengers, however landed in India after having completed nine days from the date of departure from such places. It was found during the year that east-bound aeroplanes were not always regular in sending the Sanitary Code message as laid down in the Government of India's notice to airmen No. 39 of 1938.

The number of west-bound planes which left the airport was 308 and they carried 1,372 passengers and 1,277 members of the crew. Certificates of health were given to all these aircraft.

The general sanitation of the airport was satisfactory. All springs around the airport were reduced in size and oiled regularly to prevent mosquito breeding. All seepage areas were drained off by the construction of temporary

drains. As far as possible, burrow pits were filled in. The area beside the railway lines was canalized so that all water from the pits might drain away into various nalas. All wells not in regular use were either oiled or treated with petrol. A large number of soakage pits located in the wireless station area at Malir were found breeding mosquitoes and were properly dealt with. The Dalmia Cement Factory area which was formerly a great source of mosquito-breeding round the airport was kept well under control. The airport and the surrounding villages were regularly searched every month for adult mosquitoes. No new houses were allowed to be constructed in the villages surrounding the airport and the number of wells in these villages was reduced to the absolute minimum.

The construction of a dispensary for government servants was started. It will include a bacteriological laboratory and an out-patients dispensary for the airport staff. The isolation hospital was completed and furnished and a disinfection chamber added to it. No suspected cases of yellow fever were admitted to this hospital.

Antirat measures were carried out.

Port of Calcutta.

A total of 1,324 vessels entered the port during 1938 of which 31 were inspected, while out of 1,317 out-going vessels, 1,229 were inspected. Twenty-three members of the crew and 148 passengers, including contacts, were prevented from sailing on these vessels for various reasons.

Six infected vessels arrived during the year under review. Each of these had one or two cases of chickenpox on board. All the necessary preventive measures were taken. Three cases of cholera, one of smallpox and another of measles were removed to hospital from sea going vessels while they were lying in this port. Disinfection was carried out in all cases and vaccination was also carried out, where necessary.

The sanitation of the port area was carried out as before by a staff of the Calcutta Port Commissioners. The Port Health Department carried out periodical inspections and brought defects to the notice of the Port Commissioners. Antirat operations were carried out throughout the year. None of the rats sent for bacteriological examination was found to be infected with plague. For antimosquito measures close cooperation was maintained by the port health authorities and the Garden Reach Antimalaria Association and measures were taken on ships and on the shore throughout the year.

During 1938 the provisions of 857 ships were inspected and 29 samples of ghee and one of lime-juice were collected for analysis at the Bengal Public Health Laboratory. Three samples of ghee were reported as adulterated and the shipping companies concerned were asked to replace these stocks. In four vessels condensed milk manufactured by firms other than those approved by the Government of India was found and was replaced by approved brands. On four vessels articles of food such as biscuits, sugar and rice were found to be unwholesome and were either replaced or destroyed.

Two ships carrying pilgrims to the Hedjaz sailed from this port. The prospective pilgrims were both vaccinated against smallpox and inoculated

against cholera during their stay in Calcutta. The pilgrims were medically examined by the Port Health Department at the time of embarkation.

Calcutta Marine Airport.

At the marine airport located at Bally Bridge within the limits of the Port of Calcutta, east-bound flying boats were inspected at the time of departure and west-bound flying boats on arrival, with effect from February 1938. During the period, February—December, a total of 115 flying boats with 576 passengers and 601 members of the crew entered the port and 119 boats with 457 passengers and 600 members of the crew left the port.

Port of Madras.

All the vessels which arrived in the port, totalling 688, were inspected. The number of passengers and crew, who underwent inspection was 84,491 and 61,425 respectively. Three cases of chickenpox and one case of cholera were removed from the vessels and sent to the Infectious Diseases Hospital, Madras.

Outgoing vessels numbered 688. A total of 48,705 passengers and 60,489 members of the crew was inspected.

Antimosquito measures were carried out by a special staff employed by the Port Trust.

Port of Chittagong.

During 1938, 174 incoming vessels with 68,699 passengers and 15,957 members of the crew were inspected. No case of infectious disease was discovered on any of these vessels.

During the year, 148 vessels left for foreign ports and 37,382 passengers and 13,435 members of the crew were examined medically before embarkation.

One case of smallpox occurred among the crew of a vessel while in the harbour. The patient was removed to hospital and necessary preventive measures were taken. One deck passenger of a vessel from Rangoon was found suffering from chickenpox. He was sent to hospital and the infected part of the vessel was disinfected.

Lascar's provisions in 39 ships were inspected.

The general sanitation of the port was satisfactory.

Port of Cochin.

The Port Health Officer in Cochin is a part-time officer, his main duties being those of the civil surgeon in British Cochin. He has at present no staff

working under him and therefore no measures for mosquito control, rat destruction or food control were carried out as in the case of the other major ports, whose activities have been summarised in this report.

Port of Vizagapatam.

The number of incoming foreign passenger vessels during the year was 52. They carried 18,057 passengers and 6,058 members of the crew. In addition, 192 cargo vessels called at this port. Of these twelve came from the east coast of Africa within the limits of Port Sudan and Durban. All were inspected before their entry into the harbour and no case of infectious disease was discovered.

Outgoing vessels numbered 52 and had on board 290 passengers and 5,927 members of the crew. Of the 192 cargo vessels which left this port, 39 sailed for foreign ports. Owing to the declaration of this port as infected with chicken-pox from 14th February to 3rd June 1938, the disinfection of the personal effects of the passengers of the outgoing passenger vessels was carried out during that period.

Lascar's provisions and drugs were examined.

SECTION VI.

VACCINATION AGAINST SMALLPOX.

Vaccination and Revaccination Statistics.

47. The statistics of vaccination in British India and the provinces for 1938-39 are given in the appendix to this section (page 229). Unlike the other figures contained in this report, the figures presented in the appendix and in the tables set out in this section relate to the financial year and not to the calendar year.

Table VI (*i*) sets out the numbers of primary vaccinations and revaccinations performed during 1938-39 in the provinces. The increase or decrease, as the case may be, in comparison with the corresponding figure for 1937-38, is also shown.

TABLE VI (*i*).

	Primary Vaccination.		Revaccination.		Total.	
	No. of vaccinations performed during 1938-39.	Increase (+) or decrease (—) from last year.	No. of revaccinations performed during 1938-39.	Increase (+) or decrease (—) from last year.	Total. 1938-39.	Increase (+) or decrease (—) from last year.
British India . .	10,204,648	—215,338	13,488,906	—1,424,491	23,693,554	—1,639,829
N.-W. F. P. . .	143,848	—36,832	145,827	—48,711	289,675	—85,543
Punjab . . .	1,057,097	—8,118	3,572,230	—1,136,685	4,629,327	—1,144,803
Delhi . .	22,857	+8,579	131,784	+68,776	164,641	+77,355
U. P. . . .	1,606,335	—12,155	309,094	+42,478	1,915,429	+30,323
Bihar . . .	994,795	+4,015	505,969	+127,000	1,500,764	+131,015
Orissa . . .	238,023	+7,827	402,668	—22,095	640,691	—14,268
Bengal . . .	2,876,619	—198,200	4,972,453	—551,809	7,849,072	—750,009
C. P. . . .	514,752	—5,901	118,236	+8,232	632,988	+2,331
Bombay . . .	628,183	—13,296	255,042	—292,110	883,225	—305,406
Sind . . .	137,013	—1,557	83,162	—22,825	220,175	—24,382
Madras . . .	1,481,847	+15,344	2,590,449	+397,230	4,072,296	+412,574
Coorg . . .	2,521	—720	3,483	—708	6,004	—1,428
Assam . . .	463,800	+25,783	391,234	+3,344	855,034	+29,127
Ajmer-Merwara .	26,958	—107	7,275	+3,392	34,233	+3,285

For British India as a whole there has been a fall both in respect of primary and revaccinations. The same is the case with regard to the provinces of the N.-W. F. Province, the Punjab, Bengal, Bombay, Sind and Coorg.

On the other hand Delhi, Bihar, Madras and Assam recorded increases in both primary vaccinations and revaccinations. In the other provinces increases were shown only for one of the two.

Table VI (*ii*) gives, for the past eight years, the numbers of live births and of primary vaccinations performed each year. The last column shows the proportion of primary vaccinations to 100 live births.

TABLE VI (*ii*).

Year.	No. of live births.	No. of primary vaccinations.	Rate of primary vaccinations per 100 live births.
1931-32	8,814,836	9,012,950	102
1932-33	8,718,620	9,365,226	107
1933-34	9,317,918	9,284,821	100
1934-35	8,923,169	9,506,666	107
1935-36	9,299,021	10,022,554	108
1936-37	9,566,379	10,404,125	109
1937-38	9,388,457	10,419,986	111
1938-39	9,398,011	10,204,648	109
Annual average, 1933-34 to 1937-38.	9,298,989	9,927,630	108

In comparison with 1931-32 the increase in the number of primary vaccinations performed during the year under review was nearly 1,200,000 and the rate of these vaccinations per 100 live births rose from 102 to 109. Compared with 1937-38, however, 1938-39 showed a fall of two in this rate and the increase over the average for the previous five years was only one.

In the discussion on the incidence of smallpox in the provinces (page 35) it was pointed out that a high proportion of mortality from this disease among infants and children was prevalent all over the country. Primary vaccination should confer a considerable degree of protection on this section of the population and any relaxation of effort such as is indicated in many provinces by the figures presented in table VI (*i*) is to be deprecated.

Table VI (*iii*) sets out revaccination figures over a period of eight years ending with the year under review. The total number of revaccinations done during 1938-39 was less by about a million and a half than that carried out during the previous year.

TABLE VI (*iii*).

Year.	No. of revaccinations.
1931-32	5,334,148
1932-33	10,082,421
1933-34	11,604,663
1934-35	12,443,590
1935-36	14,011,904
1936-37	12,805,764
1937-38	14,913,397
1938-39	13,488,906
Annual average, 1933-34 to 1937-38	13,155,860

Success rates for primary vaccinations and for revaccinations during 1938-39 are set out in table VI (*iv*) for British India and the different provinces.

VACCINATION CHART SHOWING PERCENTAGES OF SUCCESSFUL CASES TO TOTAL OPERATIONS DURING 1938-39

TABLE VI (*iv*).

	Percentage of success.	
	Primary.	Revaccination.
British India	98	48
N.-W. F. P.	98	82
Punjab	99	65
Delhi	98	60
U. P.	98	48
Bihar	99	56
Orissa	97	64
Bengal	86	31
C. P.	98	58
Bombay	100	49
Sind	100	26
Madras	98	24
Coorg	96	55
Assam	95	60
Ajmer-Merwara	92	85

The percentages of success for primary vaccination in the provinces vary widely, from 86 per cent in Bengal to 100 per cent in Bombay and Sind. Provided the vaccine lymph is of high quality and the conditions under which primary vaccination is carried out are satisfactory the percentage of success should not be so low as 86. It is therefore desirable that the reason for this rate in Bengal should be investigated by the health authorities of that province.

In regard to revaccination no such deductions can be drawn from the varying rates for the different provinces, because success depends on the extent of immunity present in the individual who is revaccinated.

The average number of vaccinations carried out by a vaccinator in British India was 2,809 during the year under review. In last year's report it was pointed out that the corresponding figure of 3,099 was not satisfactory and that a vaccinator should be able to produce a higher record of work. A further fall of 290 makes the position even worse. A comparison of the figures for individual provinces in table VI (*v*) shows that the range of variation is high, from 1,001 in Coorg to 7,720 in the Punjab. In the latter the average figure for a vaccinator is more than two and a half times that of British India and this should stimulate efforts for getting more work out of vaccinators in those provinces where the figures are low.

TABLE VI (*v*).

British India	2,809
N.-W. F. P.	6,294
Punjab	7,720
Delhi	4,658
U. P.	1,995
Bihar	1,242
Orissa	2,245
Bengal	3,008
C. P.	1,705
Bombay	2,395
Sind	2,661
Madras	3,025
Coorg	1,001
Assam	1,645
Ajmer-Merwara	2,140

Compulsory Vaccination.

48. Table VI (*vi*) gives the numbers of towns and districts in the different provinces in which compulsory primary vaccination is in force.

TABLE VI (*vi*).

	Towns.			Districts excluding towns.		
	Total No.	No. in which Vaccination Act is in force.	No. to which the Act has not yet been extended.	Total No.	No. in which Vaccination Act is in force.	No. to which the Act has not yet been extended.
British India .	1,535	1,245	290	222	110	112
N.-W. F. P. .	17	10	7	6	..	6
Punjab . .	258	248	10	29	27*	2
Delhi . .	6	6	..	1	1	..
U. P. . .	440	262	178	48	..	48
Bihar . .	53	53	..	16	11	5
Orissa . .	8	8	..	8	2	6
Bengal . .	119	119	..	27	27	..
C. P. . . .	113	93	20	19	7†	12
Bombay . .	130	76	54	20	1†	19
Sind . . .	26	12	14	8	..	8
Madras . . .	323	323	..	24	24	..
Coorg . .	5	5	..	1	1	..
Assam . .	32	26	6	14	9‡	5
Ajmer-Merwara .	5	4	1	1	..	1

In British India in 81 per cent of the towns and in approximately 50 per cent of the rural districts primary vaccination is compulsory. In the provinces of Delhi, Bihar, Orissa, Bengal, Madras and Coorg vaccination is compulsory in all the urban areas. A total number of 290 towns in British India has not yet introduced compulsory vaccination and of these the large majority are in the United Provinces (178) followed by Bombay (54), the Central Provinces (20) and Sind (14). In the other provinces the numbers of such towns are small.

As regards rural areas, compulsory primary vaccination is being enforced throughout the provinces of Bengal, Madras, Delhi and Coorg. In the N.-W. F. Province, the United Provinces, Sind and Ajmer-Merwara compulsion has not yet been introduced into any rural area. Bombay Presidency falls practically into the same category while, in the other provinces, varying numbers of rural districts have been brought within the range of the compulsory law.

*Including nine districts to which the Vaccination Act is extended in a part of the district only.

†Partly.

‡Towns only.

Vaccine Institutes and Supply of Vaccine.

49. Vaccine institutes exist in the provinces of the Punjab, the United Provinces, Bihar, Bengal, the Central Provinces, Bombay, Madras and Assam. Of the remaining provinces, the N.-W. F. Province and Delhi receive their supply from the Punjab Vaccine Institute, Orissa from Bihar and Sind from the Bombay Government's Vaccine Institute at Belgaum. Table VI (*vii*) gives details of the lymph produced by and issued from provincial institutes :—

TABLE VI (*vii*).

Vaccine institutes.	Output in doses.	Issues in doses.
Punjab	8,058,075	8,809,875
U. P.	3,078,450	3,072,425
Bihar	2,542,745	3,070,958
Bengal	8,755,720	8,546,096
C. P.	801,440	666,760
Bombay	1,838,075	1,560,985
Madras	4,294,530	2,820,435
Assam	994,679	1,026,373

The figures for the yield of pulp per buffalo and cow calf respectively reported from the different provincial institutes vary widely. For instance, in the Punjab, the average yield of a buffalo calf was 120·4 grammes, in the United Provinces 72·8, the Central Provinces 70·1, Bengal 47·7, Bombay 46·6 and Madras 24·3. As regards cow calves, the average yields were 44·5 grammes in the Central Provinces, 38·1 in the Punjab, 35·5 in Assam, 34·0 in the United Provinces, 31·2 in Bihar, 28·4 in Madras, 28·3 in Bengal and 23·4 in Bombay.

It is reported that the quality of the vaccine lymph issued from these provincial institutes was high and that all samples of lymph were tested with regard to purity and potency. In the United Provinces it is stated that field tests on samples of vaccine lymph are carried out by performing primary vaccination on six children in each of ten municipalities situated in different parts of the province. It was only on obtaining fairly uniform case success and insertion success rates in all these places that the lymph was issued for use among the general population.

The period required for a satisfactory reduction in the number of organisms in the vaccine lymph by the action of glycerine at 32° F. was investigated. Samples of lymph prepared in September and October were found to contain a large number of organisms and to require a longer period for the reduction of their number than vaccine lymph prepared during the cooler months, November to February. The effect of chloroform on vaccine lymph was also investigated. Four samples were chloroformed on the day of preparation (February and March, 1936) and later again after a period of seven months in October of the same year. The samples retained their potency and yielded good results on vaccination after periods varying between 15 and 24 months from the date of preparation.

In the King Institute, Guindy, a considerable amount of research work was carried out for the purpose of comparing variola virus with vaccinia virus. A strain of smallpox virus, after an initial passage in a monkey, was stabilised by 42 passages in calves and was then compared with vaccinia virus. It is stated that " cross agglutination, cross precipitation and cross complement fixation tests reveal no differences between the passaged variola strain and vaccinia virus. Protection tests also confirm the above finding".

It has been shown recently by workers in other countries that the vaccinia virus consists of two parts, namely, elementary bodies and a specific soluble substance. It has also been shown that the elementary bodies and specific soluble substance consist, in each case, of a heat-stable and a heat-labile constituent, which produce specific antisera. Tests with regard to the heat-stable and heat-labile fractions of the passaged variola virus are in progress.

In the previous annual reports details were given of the numbers of persons trained in vaccination in certain provinces as well as of provincial vaccination staff. From year to year there is but little change in respect of such details and these have therefore been left out in the present report.

Indian States.

50. In the previous annual reports figures relating to the vaccinations carried out in a few Indian States were included. For 1938 similar information has been obtained from a much larger number of States and is presented in the table below. Brief notes regarding the organisation for carrying out vaccination in some of the larger States are also given.

TABLE VI (*viii*).

State.	Population.	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Re-vaccination.	Total.	Primary.	Re-vaccination.	Under 1 year.	1-6 years.
Mysore	6,839,022	181,990	68,790	250,780	88·3	31·4	63,016	76,177
Jaipur	2,631,775	94,897	3,754	98,651	97·2	67·2	71,568	9,874
Marwar	2,125,982	83,192	61,728	144,920	87·4	100·0	Not available.	Not available.
Mewar	1,566,910	34,156	26	34,182	99·9	100·0	20,923	11,246
Bikaner	936,218	26,493	17,871	44,364	99·1	58·5	16,902	7,959
Kotah	685,804	15,973	..	15,973	100·0	..	15,533	404
Alwar	749,751	26,429	2,101	28,530	95·9	84.3	15,073	2,927
Bharatpur	486,954	22,518	1,312	23,830	96·9	58.4	11,377	7,034
Dholpur	254,986	9,657	347	10,004	96·4	100.0	6,556	2,646
Dungarpur	227,544	1,993	..	1,993	100·0	..	462	1,181
Banswara	225,106	2,926	..	2,926	100·0	..	964	1,697
Bundi	216,722	5,090	..	5,090	100·0	..	3,265	1,378
Sirohi	216,528	5,101	..	5,101	97·2	..	4,702	255
Palanpur	264,179	8,100	1,207	9,307	84·1	100·0	5,756	644
Hyderabad	14,436,148	389,721	7,987	397,708	89·4	53·7	95,686	189,739
Jammu and Kashmir	3,646,243	118,162	87,040	205,202	97·5	78·9	65,181	40,857
Kolhapur	957,137	32,407	3,439	35,846	99·9	98·9	24,289	2,527
Akalkot	92,605	2,821	100	2,921	99·7	100·0	2,102	698
Aundh	76,507	1,713	2,589	4,302	99·7	10·6	1,138	485
Bhor	141,546	4,177	738	4,915	99·0	23·0	2,830	1,137
Janjira	98,296	3,054	1,233	4,287	100·0	80·0	1,396	1,480

State.	Population.	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Re-vaccination.	Total.	Primary.	Re-vaccination.	Under 1 year.	1-6 years.
Jamkhandi	114,282	3,995	92	4,087	99·8	28·3	3,910	774
Jath	91,099	2,770	977	3,747	100·0	12·7	1,851	917
Karbhari	44,204	1,814	2,141	3,955	95·0	25·0	1,321	385
Kurundwad	39,583	1,661	282	1,943	99·3	28·7	1,363	277
Miraj Senior	93,938	3,637	174	3,811	100·0	100·0	2,821	799
Miraj Junior	40,684	1,351	309	1,660	100·0	72·6	1,000	351
Mudhol	62,832	2,150	431	2,581	100·0	15·0	1,806	339
Ramdurg	35,401	1,113	458	1,571	100·0	51·2	864	249
Sangli	258,442	10,110	10,220	20,330	99·1	12·9	7,477	2,416
Savanur	20,320	848	354	1,202	99·1	90·1	713	135
Sawantwadi	230,589	6,977	324	7,301	99·8	78·4	4,990	1,946
Wadi	1,704	41	..	41	100·0	..	13	28
Travancore	5,095,973	204,582	738,704	943,286	91·4	36·6	28,090	139,606
Cochin	1,205,016	51,102	53,633	104,735	92·9	17·3	1,755	25,892
Pudukkottai	400,694	14,782	6,503	21,285	96·6	82·1	4,176	7,590
Bamra	151,047	4,505	31,031	35,536	100·0	85·8	1,166	3,303
Baudh	135,248	5,276	12,726	18,002	85·9	63·2	257	4,196
Dhenkanal	284,326	322	4,340	4,662	88·3	62·1	36	329
Gangpur	356,674	11,662	24,873	36,535	87·0	85·0	5,259	4,827
Keonjhar	460,609	23,168	26,172	49,340	91·2	85·7	388	7,543 18,714

State.	Population.	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Re-vaccination.	Total.	Primary.	Re-vaccination.	Under 1 year.	1-6 years.
Nayagarh	142,406	5,525	19,222	24,747	94·0	67·2	233	5,292
Seraikela	143,525	7,529	1,614	9,143	99·7	67·4	2,580	4,605
Sonepur	237,920	7,589	18,093	25,682	99·4	56·1	4,768	2,719
Talcher	69,702	1,734	3,067	4,801	93·8	56·3	453	721
Mayurbhanj	889,603	46,407	43,140	89,547	98·7	98·8	9,817	16,876
Cooch Behar	590,866	18,021	35,271	53,292	80·8	71·1	Unknown.	Unknown.
Tripura	382,450	9,012	4,714	13,726	88·1	82·3	1,786	4,477
Bastar	524,721	24,662	18,583	43,245	98·0	74·0	5,835	17,701
Jashpur	193,698	5,779	20,014	25,793	77·0	48·0	2,233	2,210
Kalahandi	513,716	27,050	21,034	48,084	96·8	95·5	2,113	21,175
Kanker	136,101	5,007	1,963	6,970	98·6	90·1	3,850	933
Khairagarh	157,400	6,590	7,007	13,597	95·5	41·7	4,321	3,327
Korea	90,886	2,262	199	2,461	68·3	11·1	1,439	642
Nandgaon	182,380	6,582	4,955	11,537	99·4	78·0	5,823	557
Patna	566,924	21,050	60,922	81,972	98·9	95·6	1,194	19,544
Raigarh	277,569	8,293	1,044	9,337	93·4	71·1	4,079	2,866
Sarangarh	128,967	3,422	182	3,604	95·3	8·2	2,201	152
Surguja	501,939	8,488	8,748	17,236	79·5	90·6	2,326	3,349
Tehri (Gahrwal)	470,109	11,558	801	12,359	98·8	72·4	4,587	6,026
Benares	391,165	8,147	2,718	10,865	100·0	100·0	2,608	3,562
Rampur	464,919	18,105	5,195	23,300	96·8	66·0	10,733	4,640
Indore	1,318,237	47,638	9,442	57,080	77·0	18·0	26,923	8,952
Dhar	187,304	4,954	309	5,263	94·3	5·7	2,884	2,120
Ratlam	107,321	2,710	128	2,838	96·2	100·0	1,612	788
Sitamau	28,422	297	159	456	43·9	34·9	387	69
Alirajpur	101,963	2,489	..	2,489	82·7	..	98	1,713
Sailana	35,223	554	..	554	100·0	..	141	413
Jhabua (for Khalsa area only)	96,417	*	*	*2,735	99·9	..	649	1,370
Barwani	141,110	4,833	..	4,833	100·0	..	3,913	920
Jaora	100,166	2,456	..	2,456	100·0	..	2,163	383

*Separate figures for primary vaccination and revaccination are not available.

State.	Population.	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Re-vaccination.	Total.	Primary.	Re-vaccination.	Under 1 year.	1-6 years.
Bhopal	729,955	24,960	11	24,971	92·5	100·0	16,165	6,944
Dewas senior branch	83,321	2,277	..	2,277	..	..	919	1,358
Dewas junior branch	70,513	2,413	10	2,423	94·8	0·4	1,088	1,193
Rajgarh	134,891	3,180	276	3,456	91·3	100·0	2,054	1,402
Narsingarh	113,873	4,469	..	4,469	95·7	..	3,065	1,217
Khilchipur	45,583	587	6	593	99·5	100·0	360	230
Orchha	314,661	9,913	1,463	11,376	97·5	91·3	7,343	989
Datia	158,834	5,234	124	5,358	98·1	100	4,568	508
Samthar	33,307	1,223	..	1,223	99·1	..	1,000	212
Panna	212,130	5,770	34	5,804	94·1	82·4	3,477	461
Charkhari	120,351	6,307	..	6,307	98·6	..	3,010	2,533
Ajaigarh	85,895	2,056	..	2,056	90·4	..	1,266	360
Bijawar	115,852	5,136	..	5,136	83·8	..	4,303	..
Baoni	19,132	503	3	506	99·4	100·0	326	129
Chhatarpur	161,267	5,070	..	5,070	98·4	..	3,878	581
Nagod	74,589	2,846	52	2,898	88·3	..	1,966	79
Maihar	68,991	1,953	48	2,001	95·0	100·0	1,049	714
Phaltan	58,731	1,696	1,776	3,472	87·0	81·0	1,258	438
Rewa	1,596,971	57,467	71	57,538	98·0	73·2	33,045	20,706

In the Hyderabad State primary vaccination of infants between six months and one year of age was made compulsory in 1925. As this order does not cover children beyond the age of one, a draft Vaccination Act is reported to be under consideration, which, when approved by H. E. H. the Nizam's Government, will make both primary and revaccinations compulsory in the State.

It is reported that, since the reorganisation of the State Public Health Department in 1934, greater supervision has been exercised over the work of the vaccination staff and that the mortality from smallpox has begun to show a tendency to decrease. The State manufactures its own vaccine lymph, over 400,000 doses being distributed to the various vaccinating agencies in the State. It is stated that the vaccine is subjected to the routine potency and bacteriological tests before issue and that careful records are being maintained. A total number of 397,708 vaccinations was performed during 1938, primary vaccinations producing a success rate of 89·4 per cent and revaccinations of 53·7 per cent.

In Mysore State the incidence of smallpox in 1938 is stated to have been low. However, as a routine preventive measure, 250,780 vaccinations were performed, of which 22·0 per cent were among infants under one year of age, 36·5 among children between one and five years and 20·3 per cent among children aged five to ten years while the remaining 21·2 per cent were among persons aged ten years and over.

In Kashmir smallpox is stated to have occurred in a mild form in several tehsils and vaccination of the people on a large scale is stated to have been carried out. A compulsory Vaccination Regulation is stated to be in force in the cities of Jammu and Srinagar and the possibility of its being extended throughout the State is being considered. During 1938 the total number of vaccinations performed was 205,202, the success rates for primary and revaccinations being 95·1 per cent and 57·9 per cent respectively.

In Travancore vaccination is compulsory in all the municipalities, which number 17. In the rural areas, it was made compulsory in 1932 by the issue of temporary regulations and since then these have been renewed from year to year. The total strength of the vaccination staff is reported to be 118, of whom four are women. The minimum for each vaccinator is 50 vaccinations per day. During 1938, the total number of vaccinations performed was 943,286. Primary vaccinations gave a success rate of 91·4 per cent and revaccinations 36·6 per cent.

The Director of Public Health, Cochin State, reports that his is one of the very few Indian States in which primary and revaccination are both compulsory. Vaccination is carried out throughout the year. A total of 104,735 vaccinations was carried out in 1938, the success rates achieved for primary and revaccinations being 92·9 per cent and 17·3 per cent respectively.

In Indore it is reported that primary vaccination is compulsory and that little difficulty is experienced in enforcing it. Revaccination is not yet popular, although its number is gradually increasing in recent years. During 1938 the numbers of primary and revaccinations performed were 47,638 and 9,442 giving a total of 57,080, the success rates being 77 per cent and 18 per cent respectively.

SECTION VII.

PUBLIC HEALTH WORKS.

51. During 1938, the municipalities of British India spent, out of a total income of nearly 1,535·22 lakhs, a sum of Rs. 443·76 lakhs or approximately 28·9 per cent on public health activities and, of the latter amount, 74·2 per cent was spent on conservancy, water supply and drainage. The corresponding figures for district boards were 1,867·04 lakhs, 133·70 lakhs (7·2 per cent of the total income) and 25·4 per cent respectively. The figures for expenditure under these heads for British India and the provinces are shown in tables VII (*i*) and (*ii*).

TABLE VII (*i*).

EXPENDITURE BY MUNICIPALITIES.

	Income.	Public health expenditure.	Percentage of total income expended on public health.	Expenditure on			Percentage of the total of Cols. (4), (5) and (6) to Col. (2).
				Conservancy.	Water-supply.	Drainage.	
	1	2	3	4	5	6	7
	Rs.	Rs.		Rs.	Rs.	Rs.	
BRITISH INDIA	15,35,21,678	4,43,75,667	28·9	1,64,16,173	1,15,65,151	49,29,651	74·2
N.-W. F. P.	25,75,683	5,31,080	20·6	2,39,644	1,33,629	41,173	78·0
Punjab	2,10,02,308	46,31,810	22·1	16,68,032	13,74,614	8,78,606	84·7
Delhi	89,12,281	22,03,769	24·7	6,49,883	9,35,063	2,77,748	84·5
U. P.	2,35,32,604	1,00,80,652	42·8	27,83,094	26,02,253	8,91,302	62·3
Bihar	61,70,950	19,04,198	30·8	10,74,071	3,98,295	2,85,048	92·2
Orissa	9,65,196	3,43,721	35·6	2,14,661	24,181	18,876	75·0
Bengal	1,01,39,004	54,09,142	53·3	24,84,783	14,65,984	4,48,294	81·3
C. P.	95,73,250	23,65,622	24·7	11,82,291	5,89,061	2,23,857	84·3
Bombay	2,44,18,770	59,65,258	24·4	26,42,759	17,44,880	7,00,678	85·3
Sind	1,27,12,123	28,87,205	22·7	9,08,020	7,50,643	4,30,795	72·4
Madras	3,19,19,074	74,74,049	23·4	22,60,869	13,48,816	7,01,568	57·7
Assam	16,00,435	5,79,161	36·2	3,08,066	1,97,732	31,706	92·8

TABLE VII (*ii*).

EXPENDITURE BY DISTRICT BOARDS.

	Income.	Public health expenditure.	Percentage of total income expended on public health.	Expenditure on			Percentage of the total of Cols. (4), (5) and (6) to Col. (2).
				Conservancy.	Water-supply.	Drainage.	
	1	2	3	4	5	6	7
	Rs.	Rs.		Rs.	Rs.	Rs.	
BRITISH INDIA	18,67,08,840	1,33,70,306	7·2	11,18,987	21,45,548	1,41,836	25·4
N.-W. F. P.	21,84,842	77,026	3·5	6,635	12,361	2,343	27·7
Punjab	2,46,56,373	8,30,358	3·4	*	*	*	*
Delhi	3,56,228	45,737	12·8	14,193	...	...	31·0
U. P.	2,26,93,072	3,09,021	1·4	8,361	12,584	4,739	8·3
Bihar	1,82,25,131	6,43,408	3·5	2,58,027	2,18,827	32,074	80·0
Orissa	27,61,489	2,11,657	7·7	18,220	50,187	1,404	32·9
Bengal	1,61,88,346	50,27,297	31·1	...	9,06,992	97,526	20·0
C. P.	1,05,09,533	5,50,712	5·2	...	82,191	...	14·9
Bombay	2,28,70,818	8,19,303	3·6	...	4,79,082	1,345	58·6
Sind	49,90,061	2,96,211	5·9	11,023	24,478	...	15·4
Madras	5,69,96,113	44,30,557	7·8	7,97,528	2,66,239†	‡	24·0
Assam	42,71,834	1,29,019	3·0	...	82,607	2,405	65·9

*Information not available.
†Includes expenditure on drainage as well.
‡Included under expenditure on water-supply

The rates of expenditure by rural health authorities on public health activity as a whole and on such essential services for the maintenance of environmental hygiene as conservancy, water-supply and drainage, were much less than those of municipal authorities. The percentages of income spent on public health measures in municipalities ranged between 20·6 per cent in N.-W. F. P. and 53·3 per cent in Bengal while, in rural districts, the lowest and highest rates of expenditure were 1·4 per cent in the United Provinces and 31·1 per cent in Bengal. Apart from this disparity between urban and rural areas in respect of the money spent on public health, the proportions of this amount in each province spent on conservancy, water-supply and drainage are relatively less in the villages than in towns. Even in urban areas the state of environmental sanitation is far from satisfactory and the much smaller amounts spent in rural areas must therefore be regarded as altogether inadequate to meet their needs.

An improvement of sanitation, particularly in the rural areas, can be accomplished only by the adoption of methods which are suited to local conditions. Costly schemes of water-supply and drainage are definitely ruled out. The necessity for securing the interest and co-operation of the people in measures designed for their own welfare demands that they should be encouraged to participate in the execution of such measures. In this connection it may not be out of place to quote the following extract from the Report of the Inter-Governmental Conference of Far Eastern Countries on Rural Hygiene held at Bandeong (Java) in August 1937 :—

" It was the custom in India—a custom which still fortunately exists in certain parts—for villagers to carry out certain duties without any remuneration. Free labour was their contribution for communal works. In this way, roads were made or repaired, the village was cleaned and pits filled up. If this custom could be revived or introduced where it does not exist, the amenities of village life could be vastly improved, for the villager himself is unable to pay for hired labour, and it is hardly likely that the Government can fully provide either the men or the finance for such works.

" All people in the area should be induced to participate in the programme—the poorest and the more prosperous, all castes and creeds, men and women, adults and children—all sections helping and all being helped by it."

The brief notes on individual provinces, which are given in the later paragraphs, indicate that attempts are being made, with partial success in some areas, to induce the people to participate in the improvement of village sanitation by giving help through free labour and through monetary contributions. The rate of progress is, however, bound to be slow. The minimum requirements for sanitation in villages may be stated to be the provision of a safe water-supply adequately protected against contamination, of drains to remove sullage from the inhabited area and of a satisfactory system of night soil and refuse disposal. While for the creation of such services voluntary gifts and free labour are valuable, their maintenance on an organised basis necessitates the provision of recurring funds by the taxation of the people through Village Panchayats or Union Boards. An essential condition of success is the development of a sense of civic responsibility in the rural population which, in its turn, is dependent on education and the promotion of a corporate life. The task of provincial Governments is that of stimulating local effort by suitable grants and of directing it on proper lines through technical advice and guidance. Provincial Governments and the public are now taking an increasing interest in the health of the rural population and this gives room for the hope that the rate of progress in this field of public health administration will be accelerated in the coming years.

The provision of protected water supplies is a reasonable criterion by which the level of sanitary improvement attained by a community can be judged. Table VII (*iii*) gives data regarding water-supplies in towns in British India in 1938. The corresponding figures for 1937 are also given for comparison.

TABLE VII (*iii*).

	Percentage of towns having protected water-supply.		Percentage of urban population.	
	1938	1937	1938	1937
British India	20	19	53	54
N.-W. F. P.	47	47	69	69
Punjab	22	22	48	54
Delhi	83	83	98	98
U. P.	6	6	34	33
Bihar	15	14	51	51
Orissa	25	25	35	35
Bengal	44	39	63	62
C. P.	8	8	33	33
Bombay	22	23	66	67
Sind	19	15	67	64
Madras	52	51	71	71
Coorg	50	50	61	61
Assam	32	32	49	49
Ajmer-Merwara	20	20	12	12

There appears to have been little or no change in most provinces, the exceptions being Bengal and Sind with 5 and 4 per cent increases respectively in the proportions of towns with protected water-supplies.

Further information regarding the provision of protected water-supplies in towns is available in Appendix VI in which towns with protected water-supplies are shown distributed according to the strength of their populations. Of a total number of 1,229 towns of all sizes, 19·6 per cent possess protected water-supplies. As is to be expected, towns with larger populations show a higher proportion among them of those with piped supplies. Thus, among a total of 76 towns with populations of 50,000 and over, nearly 78 per cent fall into this category and of those with populations ranging between 30,000 and 50,000 about 56 per cent belong to this group while, of towns with populations below 30,000, the proportion is as low as 13 per cent.

Brief notes regarding the public health works carried out in the provinces during 1938 are given below.

North-West Frontier Province.

52. As was pointed out in last year's report, the arrangements for the collection and removal of human excreta and street sweepings are still primitive in all the towns of the province. A slight improvement was, however stated to have been recorded in 1938 in Peshawar. As regards the rural areas it is reported that no arrangements have been provided for these purposes by district boards or by other agencies.

Slaughter-houses exist in 24 towns of the province but most of them are lacking in modern sanitary requirements and they are therefore in urgent need of improvement. There are no proper markets for the sale of food in the province and it is stated that the control of food supply on sanitary lines is not being carried out.

As regards congestion and overcrowding in towns, the Director of Public Health quotes the following remarks from the report for 1935 and states that these conditions still hold good: " There is considerable congestion and overcrowding in certain areas of towns, especially those enclosed in walls and barbed wire like Peshawar and Kohat. The expansion which has been thus limited artificially in lateral directions tends to go upwards and tall houses of many storeys in height on narrow lanes is the result. " It is essential that the question of overcrowding and congestion in these towns should receive more attention.

The Government grants-in-aid to municipalities and notified area committees for public health purposes amounted to Rs. 4,060, the greater part of which was spent on sanitary improvements and on the maintenance of existing conservancy arrangements. Government grants to district boards amounted to Rs. 20,722 and of this sum, Rs. 19,722 were spent in connection with water-supply schemes. The balance was spent on anti-malarial measures in villages around Kohat Cantonment. A sum of Rs. 31,125 was also sanctioned from the Government of India's special grant for rural reconstruction to meet the cost of water-supply, drainage and rural reconstruction schemes in five districts. The district boards spent from their own funds a sum of Rs. 21,339 on water-supply and on conservancy. It is stated that no piped water-supply exists in any of the rural areas.

Punjab.

53. The Director of Public Health states that there are 1,275 Village Panchayats in the province and, in addition, 2,889 Village Sanitary Committees formed under the provisions of the provincial District Boards Act. The functions of these local bodies include the control of sanitation in their areas but it is reported that these authorities have shown little initiative in the improvement of sanitation or in the maintenance of sanitary works. It is stated that an important cause for this state of affairs is that the strength of the supervising health staff is quite inadequate for the task entrusted to them, because for a district with an average of about 1,200 villages, the public health staff consists of a medical officer of health, a sanitary inspector, a dispenser and some 20 vaccinators. In spite of this it is claimed that some measure of success has been achieved in the improvement of rural sanitation and that the amount of work accomplished has tended to increase from year to year.

The Director of Public Health has suggested that a village may be called " sanitated " when the water-supply has been adequately protected from surface contamination, main drains have been constructed for the removal of waste water and filth and refuse are regularly removed from the village to a place prepared for their reception. On the basis of these standards he states that the number of such villages was 382 in 1936, 1,962 in 1937 and 2,522 in 1938. It is also reported that sanitary work of some kind was carried out in 14,571 additional villages, although these villages did not attain to the mini-mum sanitary requirements indicated above.

As regards rural water-supplies, 1,407 new wells are stated to have been constructed during the last three years, 523 of them during 1938. In addition a steadily increasing number of wells has been repaired every year. The introduction of hand pumps to wells has proved popular, 6,243 having been installed in 1938. In order to demonstrate to the villagers the value of properly constructed wells provision was made, from the special Development Fund for rural areas, for the construction of 232 demonstration wells in villages. It is stated that this measure has resulted in making the villagers more willing to undertake themselves similar improvement of the remaining wells in their villages.

The paving of streets and the provision of drains and of refuse pits in villages are stated to be making steady progress. The special rural development scheme covers a period of five years and it has been proposed to make provision, under this scheme, for the supply of skilled labour for drainage and paving works in villages in specially selected tahsils. During the year the supply of skilled labour was made available to 286 villages.

Delhi.

54. The report of the Chief Health Officer records progress in many directions. A welcome feature of the measures adopted is that successful attempts were made to secure the active co-operation of the villagers in the betterment of their living conditions.

Two noteworthy advances in the sphere of rural health administration were the inauguration of the Central Officers' Board, which has as its function the co-ordination of all welfare activities in the villages, and the formation of Village Committees to which are entrusted local responsibility for the improvement of existing conditions and for the maintenance of such improvements. The Village Committees report to the Central Officers' Board the progress achieved and ask for assistance from the Board for the carrying out of their schemes.

In order to provide an object lesson to the villagers in environmental hygiene a scheme was started for improving rural housing on the understanding that financial assistance was given by the owners according to their means. "Cooking places with smoke flues have been introduced, improved cattle standings have been made, bathing places have been installed, bore-hole latrines and sullage bore-holes have been built, rat-proof food storage has been provided and small vegetable gardens fed from waste water have been planted in the house courtyards." It is stated that these improvements have made an excellent impression on the minds of the villagers. Special mention may be made of an increase in the cultivation of vegetables during the year to the extent of over 1,000 acres of land. The extension of such cultivation is bound to have an increasingly beneficent effect on the health and well-being of the rural population.

Another direction in which progress was achieved was in respect of village water-supplies. The original idea was that the villagers should be asked to contribute 50 per cent of the cost in cash or kind, but the failure of crops resulting from the absence of rains made it impossible to secure any substantial assistance from the people. Nevertheless, 78 wells were repaired, 26 tube wells were provided and one well costing over Rs. 24,000 was constructed. It is stated that a grant of Rs. 10,000 will be required to meet the needs of all

the villages in the province. An annual grant for the repair and maintenance of at least those wells which belong to the sweeper and *chamar* class, who are not able to pay for themselves, is also considered essential.

A " best village competition " was held in the province under the auspices of the newly created Central Officers' Board and all departments interested in village welfare took part in the competition. The period over which judging was carried out extended to six months, so that the efforts at improvement had to be sustained and not spasmodic.

A serious problem which the Health Department had to tackle during the year was that of the nuisance caused by fly breeding in the sludge of the Okla Sewage Works. Suitable action was taken and the nuisance was stopped. The Chief Health Officer draws attention to a similar problem of fly breeding at the City Refuse Dump at Badli and points out that, although different methods were tried, no substantial improvement was recorded.

The improvements carried out in New Delhi included the cleaning up of a number of dairies in and around Connaught Place, the enforcement of stricter sanitary control over the hotels and restaurants catering for all classes of the population and the improvement of the municipal markets by minor alterations and more efficient supervision.

In Delhi city slum clearance is of great importance. The decision taken during the year by the Delhi Improvement Trust not only to clear the slums but to provide facilities for the rehousing of the dispossessed population on hygienic lines and to afford financial asistance to those needing it, constitutes therefore an important contribution to the solution of a difficult problem.

United Provinces.

54. Grants sanctioned for rural public health works during 1938-39 total led Rs. 59,739 against Rs. 50,158 for 1937-38. The satisfactory maintenance of sanitary works carried out in villages presents much difficulty and it was decided that grants for smaller public health works in villages should be given only to places " where a better-living society or a panchayat or some rural development association exists " so that the maintenance of the works may be entrusted to some such responsible body.

It is stated that, in 1938, over 3,900 wells were made sanitary and that a special grant of Rs. 30,000 was made for water-supply to *Harijans*. The total amount spent on rural water-supplies amounted to Rs. 2,24,540.

The popularisation of urinals and latrines in villages also received attention. It is reported that a large number of bore-hole latrines was constructed in the rural areas and that the better class village population has begun to appreciate its use. The Medical Officer of Health of the Partabgarh Health Unit, as the result of field experiments carried out in that area, drew up plans and specifications of a bore-hole type of pit for receiving house sullage. It has been shown that this is particularly suited for village schools, markets and fairs. When provided with foot-rests, it can also serve as a urinal. Its plans and specifications have been circulated to the health authorities of the province for adoption in their areas.

As regards towns, the Director of Public Health states that "the sanitation of municipalities and notified areas cannot be said to be satisfactory". This is partly due to lack of funds for the execution of public health works. Nevertheless, it is pointed out that improvements were carried out, as far as funds

permitted, in many towns. These improvements included the provision of drains, the paving of streets and construction of latrines and urinals, markets and slaughter-houses and repair of wells in different places.

Municipal water-supplies were examined from time to time by medical officers of health in municipal laboratories. For the purpose of checking their results, samples were also examined periodically at the Provincial Hygiene Institute. From the table of the results of analyses given by the Director of Public Health, the proportions of samples giving unsatisfactory results with bacteriological analysis were appreciably large in many towns. An extreme example in this connection is the water-supply of Cawnpore, where 59 per cent of the samples examined bacteriologically were found to be defective.

Orissa.

56. In only two municipalities, namely, Puri and Berhampur, has a piped water-supply been provided. In the others water for drinking purposes is derived mainly from unsatisfactory sources, such as rivers and shallow ring wells, although a few masonry wells and tube wells also exist in some towns. The percentages of total income expended on conservancy, on drainage and on water-supplies in 1938 were 26·2, 1·6 and 3·6 respectively.

In the rural areas conservancy, drainage and water-supply services received only 0·4, 0·22 and 1·2 per cent respectively of the total income of the district boards.

Bengal.

57. In Bengal the expenditure on sanitary works by municipalities during 1937-38 was over Rs. 54 lakhs, or 37·5 per cent of the total income of these municipalities. Compared with 1936-37 the percentage of expenditure decreased by 1·9. Of the total amount spent, conservancy accounted for nearly Rs. 24·85 lakhs, water-supply for Rs. 14·66 lakhs and drainage for Rs. 4·48 lakhs.

In the Union Boards of the province, which numbered 5,044 in 1937-38, a sum of nearly Rs. 9·95 lakhs was spent in 1937-38 on water-supplies, Rs. 96,708 on drainage and Rs. 83,816 on conservancy.

As regards the rural water-supplies, the provincial Government initiated a policy of rapid improvement and for this purpose provided in the budget for 1938-39 a recurring grant of Rs. 7,50,000 and a non-recurring grant of Rs. 5,00,000. Thana, Divisional and District Committees were formed consisting of representatives of the Revenue, Co-operative, Public Health, Educational and Engineering Departments as well as of local bodies. To these committees was entrusted the task of formulating water-supply schemes for villages, the latter being arranged on a priority list in accordance with the following conditions:—

(1) prevalence of cholera,

(2) shortage of drinking water,

(3) income of the locality, and

(4) other things being equal, preference should be given to areas offering substantial contributions in money or in labour.

The Government felt that the principle of encouraging local contributions was sound as these stimulated the spirit of self-help. At the same time Government gave instructions that exemptions should be liberally granted to deserving cases in view of the fact that the poorer localities, with perhaps a greater need for adequate water-supplies, might be deprived of grants. Special emphasis was laid on contributions in kind, for instance labour from such villages.

Provision has also been made in the scheme for ensuring that technical supervision will be carried out by the district engineering staff and that the district health staff will have opportunities of reporting on the progress of the works from time to time and of bringing to the notice of the engineering staff such defects as may require rectification.

Central Provinces.

58. In this province it is reported that the improvement of rural sanitation has been slow. During 1938 the amounts expended in rural areas on the improvement of water-supplies, cleaning of village sites and drainage works were Rs. 12,684, 41,564 and 4,582 respectively.

In 1936, a sum of Rs. 99,828 was made available to district councils by the provincial Government for the improvement of water-supplies in rural areas out of the Government of India subsidy for rural reconstruction. The district councils could not utilise the grant in full, a few of the works sanctioned remaining incomplete even in 1938. A further sum of rupees three lakhs was earmarked for rural water-supplies from the Government of India grant. A sum of Rs. 50,000 out of this amount was included in the budget estimates of 1938-39. Of this amount, however, the district councils utilised only Rs. 3,330.

Bombay.

59. A sum of Rs. 9,64,500 was placed by the Government at the disposal of Commissioners of Divisions for the improvement of village water-supplies. A further grant of Rs. 15,500 was made to the Rural Reconstruction Association, Poona, for water-supply works in Satara district. Another sum of Rs. 20,000 was made to Manjri village for the installation of a piped water-supply. It is also stated that 718 new draw wells were constructed and that 270 step wells were converted into draw wells.

The money spent on public health works by the local bodies in the province amounted to Rs. 21,20,944 or 12·5 per cent of their total income during1937-38.

Village improvement work is carried out under the auspices of District Village Improvement Committees, which function in all the districts. Assistant Directors of Public Health attend their meetings, whenever possible, and help them with advice on matters relating to public health and sanitation. In addition to this it is reported that 145 sanitary committees and 650 panchayats were functioning in different villages during the year. The activities of these organisations are stated to be of a varied nature such as removal of manure heaps, repairs to surface drains and construction of latrines and wells. It is also stated that meetings and classes are held and that lectures on the importance of sanitation and hygiene are delivered.

Sind.

60. The expenditure on public health measures per head of the population of Karachi city was approximately Rs. 2-5-9 and Rs. 1-12-4 for the remaining municipalities which employ subsidised health staff. The Director of Public Health states that municipal authorities are very slow in carrying out the recommendations contained in the sanitary inspection reports of the Public Health Department and that, with the exception of towns with qualified health staff, the sanitation of urban areas is far from satisfactory.

It is reported that, in Sukkur municipality, certain improvements in connection with the water-supply were carried out during the year, consisting of the provision of a new rapid gravity filter at a cost of Rs. 8,000 and of settling tank for Rs. 15,000 and the renewal of cast iron water mains at a total cost of Rs. 2,00,000.

As regards rural water-supplies, the Government placed, at the disposal of the Revenue Commissioner for Sind, a sum of Rs. 18,000 for their improvement. This amount was used for the construction of 44 new wells in various districts.

The expenditure of local bodies on public health measures varied from 7 per cent of the income in Larkana district to 3 per cent in Dadu district. The average expenditure per head of the population in rural areas varied from two annas in Larkana district to six pies in Sukkur district.

Madras.

61. In Madras Presidency there are six rural sanitation units, four permanent and two temporary, which are maintained for the purpose of popularising the use of latrines in rural areas and of thus preventing soil pollution. As an ancillary activity a campaign against hookworm infection is also conducted through examinations of samples of stools of the population, mass treatment and propaganda. It is stated that the districts of Coimbatore, East Godavari and West Godavari have shown great interest in the prevention of soil pollution. As an instance may be quoted the fact that the local boards in East Godavari spent Rs. 14,795 on this work during 1938. The total amount spent by local bodies in the province on rural sanitation was Rs. 1,32,342. Public latrines were constructed in the districts in 1935-36 and 1936-37 from the Government of India grant for rural development and the Director of Public Health states that they were satisfactorily maintained by the local bodies in all except eight districts.

In last year's report reference was made to the comprehensive scheme of rural water-supplies which the provincial Government introduced for the purpose of giving a protected water supply to every village in the course of ten years. A priority list of villages in each district was prepared for the purpose of sanctioning grants. Orders were passed in 1938 approving the programme in respect of five districts, *viz.*, Tanjore, Trichinopoly, West Godavari, Ramnad and Anantapore. A disturbing feature in respect of the water-supply of certain central districts, notably Nellore, is the presence of fluorides in water over wide areas. The question has been under investigation since 1936 by the health authorities of the province.

Assam.

62. A sum of Rs. 5,79,735 or 44·5 per cent of their income was spent by the municipal boards and town committees in the province on original and recurring sanitary works compared with 45·3 per cent during 1937. The expenditure on the maintenance of water-supplies, drainage and town improvement by the Public Works Department amounted to Rs. 7,080. It is stated that, in regard to sanitary conditions, there is much room for improvement in the different municipalities.

The sanitary arrangements in rural areas are stated to be unsatisfactory. The water-supplies are liable to gross pollution both during the rainy weather and during the dry summer months.

SECTION VIII

LABORATORIES AND MEDICAL RESEARCH

Central Research Institute, Kasauli.*

63. The Institute has continued to function as the bacteriological laboratory and medical research institute of the Government of India. The routine work has consisted mainly of the manufacture of vaccines and antivenom serum to meet the requirements of the Army in India and of provinces and States, mainly in Northern India. Typhoid-paratyphoid (T. A. B.) vaccine is mainly issued for the use of the Army and demands are fairly constant from year to year. Cholera vaccine is issued in large quantities for civil use and in most years on a very large scale. Other prophylactic vaccines are manufactured and issued in smaller quantities. The Institute is the only centre in India manufacturing antivenene in large quantities and supplies all civil and military hospitals and dispensaries as well as non-official purchasers. The serum manufactured is bivalent against the venoms of the Indian cobra and Russell's viper, the snakes responsible for the majority of deaths from snakebite. Other curative or prophylactic sera are not manufactured but the Institute receives, stocks, and issues all imported sera, such as tetanus antitoxin, diphtheria antitoxin, anti-dysentery serum, etc., required by the Army in India and maintains large reserves for the purpose.

The Institute carries out the routine bacteriological examination required by the departments of the Government of India. The principal examinations are those of disinfectants for the Indian Stores Department, all samples submitted for contracts being tested for their carbolic-acid coefficient by the Rideal Walker test. Other bacteriological and serological examinations are made for certain hospitals and special examinations are done for non-Government Institutes and private practitioners on terms laid down by the Government of India.

The Institute acts as a centre of reference in regard to bacteriological and immunological problems and its extensive library is of high value for this purpose. Many requests are received for information and advice on medical and public health subjects and it is usually possible to provide the assistance required. The facilities of the library are open to all medical workers and are much utilised.

The Institute staff has continued to carry out research, from its own resources, in relation to the work in which it is ordinarily engaged and chiefly in relation to immunological problems and snake venoms. In addition the Institute has taken a leading part in the cholera researches carried out during the past five years under the Indian Research Fund Association. This work has been conducted in collaboration with some other laboratories in different parts of India and in close association with connected investigations in the laboratories of the Medical Research Council of England. Details concerning the cholera and plague researches carried out in the Institute have been incorporated in the paragraphs on these respective diseases in section II of this report.

The Director as usual continued to act as the Editor of the Indian Journal of Medical Research and Indian Medical Research Memoirs.

---

* Annual Report of the Central Research Institute, Kasauli, for 1938. Manager of Publications, Civil Lines, Delhi. Price Rs. 2 and annas 14 or 4*s.* 9*d.*

All-India Institute of Hygiene and Public Health, Calcutta.*

64. The Institute continued to perform its dual functions as a training centre for public health students and as a centre for research. Thirty students were trained for the public health diploma while in each of the three courses for D.Sc. (Public Health), diploma in maternity and child welfare and special post-graduate course for health officers, there was one student.

In addition to these courses a special post-graduate training class for tuberculosis lasting four weeks was organised at the Institute under the auspices of the King George Thanksgiving (Anti-Tuberculosis) Fund and thirty doctors from different parts of the country underwent training. Since the inception of the Institute in 1934, 108 students have qualified for public health work. Information has been collected regarding the manner in which these persons have subsequently been employed. Information was available for 96 students and of these, 37 were occupying public health posts, 14 held charge of medical institutions and 5 were employed in research. It will thus be seen that 58 per cent of those trained by the Institute were able to secure employment and that the proportion absorbed into public health service, including research, was about 44 per cent.

The different departments of the Institute carried out a number of researches, most of which were financed by the Indian Research Fund Association. Brief notes on important researches are given below :—

Cholera.—These researches are described on pages 31 to 33 in the section of the report devoted to cholera.

Epidemic dropsy.—It was pointed out last year that epidemiological and experimental evidence indicated that the causative factor in epidemic dropsy was some toxic substance ingested through mustard oil used in cooking food. It has been shown that the poisonous substance in the oil is derived from the seeds of a weed *Argemone mexicana*, which resembles the dark brown variety of mustard seed. Contamination of mustard seeds with argemone seeds appears to be accidental as the latter grows wild in many parts of the country. Human experiments with mustard oil containing a proportion of argemone oil, have shown that a clinical condition develops which is indistinguishable from mild epidemic dropsy. Chemical tests have been devised for detecting the presence of small proportions of argemone oil in mustard oil. Further, a white crystalline organic substance, which responds to these tests, has been isolated from argemone oil.

Blackwater fever and malaria.—It was mentioned last year that the treatment of seven cases of blackwater fever with glucose, ascorbic acid and cortin was uniformly successful. During the year under review five more cases were successfully treated on the same lines. No failures have so far been reported from this treatment.

An investigation for determining the excretion of vitamin C and its saturation in normal and malarial subjects resident in a hyperendemic malarial village in Bengal indicated that (1) 65 to 95 per cent of healthy children between the ages of two and ten had normal vitamin C saturation, (2) 60 to 87 per cent of malarial patients showed a condition of hypovitaminosis C, (3) during an acute attack of malaria an increased excretion of ascorbic acid in the urine

*Annual Report of the All-India Institute of Hygiene and Public Health, Calcutta, for 1938. Obtainable free of cost from the Director, All-India Institute of Hygiene and Public Health, Calcutta.

took place, the excretion being markedly less during the afebrile interval and (4) in chronic malaria patients a condition bordering on scurvy existed, which was rendered more and more intense by repeated attacks of the fever.

A study of the causes for the periodic appearance of malaria in the field malaria centre of the Institute in Burdwan district of Bengal seems to suggest that unusual rainfall during the hot dry months, March to June, leads to a progressive increase in the carrier anophelines and this in its turn to an increase in the number of new cases. Another interesting finding has also been recorded. All the three species of the malaria parasite occur in the area. In an on-epidemic year the prevailing species throughout the year is the quartan while, during an epidemic year, the predominating species is the malignant tertain. The malaria season is from July to October and, from a study of the figures for rainfall and of the relative incidence of the two species of the parasite during the earlier months of the year, it is claimed that it is possible to forecast an epidemic rise of the disease during the malaria season.

A study of the chemical and biological qualities of the water in the tanks breeding *A. philippinensis*, the carrier species, and those which did not breed this mosquito, suggested that a high proportion of carbon dioxide to oxygen favours breeding and that a low ratio is inimical to its breeding. This condition is exactly the reverse of that affecting the breeding of *A. culicifacies*. Another finding is that in tanks where large numbers of Euglena or Macrocystis are present *A. philippinensis* larvæ are absent. It is also interesting to note that, although *A. philippinensis* breeds profusely in tanks, dobas and burrow pits, systematic larval catches during the past three years have failed to show the larvæ of this species in any of the rice fields examined.

Tuberculosis.—These studies include, (1) an investigation into tuberculosis in relation to the jute industry at the Angus Jute Mills, about 23 miles from Calcutta, (2) a survey of tuberculosis in home contacts and (3) typing of tubercle bacilli from pathological material from various sources.

The jute mill investigation includes an intensive study of sample workers from different departments of the mill by physical and radiological examinations, graded tuberculin testing of all workers, a survey of home conditions to correlate them with the incidence of the disease and the assessment of the dust hazards of the industry. In regard to the last it is stated that, although the different processes through which the jute fibre passes emit such a large amount of dust as to suggest the production of harmful effects on the workers " it is remarkable that no case of physical disability, as evidenced by shortness of breath or disabling recurrent chest complaints, could be detected."

The survey of children who were contacts of cases of tuberculosis has been in progress for a few years and, in all, 839 children have been examined. While the percentages of positive reactors and of detectable X-ray lesions increase with the prolongation of the duration of contact with " open cases ", it has been noticed that the maximum incidence of enlarged tracheal and bronchial glanps occurs after 3-4 years of contact with " open cases " and in the 5-10 year age period. The highest incidence of tuberculin reaction also occurs in this age group.

As regards the typing of strains of the organism, 200 strains among the 220 isolated have already been typed out. They have all been shown to be of the human type. They were derived from such widely different sources as cervical, tracheo-bronchial, axillary, inguinal and mesenteric glands, tonsils, cold abscess pus, urine, skin, stool, stomach wash, pleural fluid, sputum and the lungs.

Maternity and Child Welfare.—There is a maternity and child welfare centre attached to the All-India Institute of Hygiene. An idea of the nature of the work done in that centre may be gained from the fact that, during the year, the total attendance at the clinic was 8,456. Further 7,500 home visits were paid by two health visitors attached to the centre and 202 ante-natal visits by the midwives. Ante-natal care was given to 541 pregnant women. Of these 541 ante-natal cases 330 were delivered in the district and three of them died, one from puerperal sepsis, another from post partum hæmorrhage and the third from tuberculosis. None of these fatal cases was delivered by the clinic staff. Postnatal care was given by midwives for ten days to the cases delivered by them. After delivery the health visitor visits the patient three times during this priod of ten days. Later, monthly visits are paid by the health visitor until the infant is one year old.

Including the infants carried over from 1937, 858 infants were under the care of the centre; out of these 45 per cent attended the centre and others received monthly visits.

Group teaching on health subjects was carried out by the health visitors throughout the year except during the hot weather. Twentysix classes were held and the average attendance was eight.

Researches included a study of the records of infants' diseases, the working out of the normal weight curve of infants and the assessment of the nutritional condition of infants by a special marking method in cooperation with the Professor of Nutrition.

Nutrition studies.—The nutritional state in regard to vitamin A of prisoners in a Calcutta jail was studied with a locally modified Birch-Hirchfield visual photometer. It was shown that vitamin A deficiency existed in as many as 43 per cent of the prisoners on a low diet and in 17 per cent of those on better diet. It was further shown that an appreciable proportion of those showing vitamin A deficiency would have been missed, particularly in the group with the low diet, if the ordinary clinical signs such as dryness of the conjunctiva and Bitot's spots were taken as the criteria. In most cases, the deficiency could be removed within a week by the administration of vitamin A concentrate in suitable doses.

Another condition which was investigated amongst the prisoners was that of angular stomatitis. An examination of the records for the years 1935-38 showed that 1,520 cases took place in this period and that this condition had a seasonal variation, with increasing incidence during the winter months from November to February and a lower prevalence in the summer months. Administration of vitamin A concentrate to 11 typical cases of angular stomatitis produced no effect on the condition. Further, in view of the fact that the composition of the jail diet was practically constant throughout the year, it is difficult to explain why there should be a seasonal variation in the incidence of this condition.

Deficiency of calcium is recognized as common in Indian diets, and a study has been made of the effects on bone and teeth of three types of Indian diets, namely good North Indian, lacto-vegetarian and poor Indian diets. These diets represent different levels of calcium intake in a descending order and groups of rats were fed on them. The results were compared with a control group fed on a well balanced diet. One observation of importance that emerged from this study is that even the North Indian diet seems to be inferior to the well balanced diet.

In Bengal, where fish forms an important item of the diet, a study of the vitamin A content of fish oils merits attention. Some 15 varieties of local fish were examined by spectrophotometric assay for determining the vitamin content in terms of international units. Three types of oils, *viz.*, body oil, depot oil and liver oil were examined separately. The body and depot oils were poor sources of vitamin A, while liver oil contained more vitamin A than that present in an ordinary brand of Norwegian cod liver oil. The liver oils of two varieties of fish, " Air " and " Boal ", have a vitamin A content nearly half of that in halibut liver oil, while liver oils from " Dhain " and " Shole " were nearly equal to halibut liver oil.

Other researches in the department of Bio-Chemistry and Nutrition included investigation of the efficiency of the intradermal test for vitamin C deficiency introduced by Rotter, determination of the limits of normality for the diameter of red blood corpuscles, studies on hæmoglobin in anæmia and investigation of the absorption spectra of various samples of mustard oil in connection with the inquiry into the causation of epidemic dropsy.

School of Tropical Medicine, Calcutta*.

65. The researches carried out are briefly summarised below :—

Department of Tropical Medicine.—A number of fractional gastric analyses has been carried out and the results obtained show that in Indians suffering from gastro-intestinal disturbances, hyperchlorhydria is a more common " error " than achlorhydria or hypochlorhydria. A study of the blood picture in acute malaria has indicated that there is a tendency for the size of the blood cells to be larger than normal, but that the Van den Bergh test (indirect) is by no means constantly positive, it being within normal limits in 79 per cent of the cases. An investigation of the blood picture in kala-azar has suggested that while there is some anæmia, this condition does not seem to progress beyond a certain point and that there is little association between the degree of anæmia and the duration of the disease. Further observations of the value of sternal puncture in the diagnosis of kala-azar show that the method is not as efficient as spleen puncture.

Department of Protozoology.—During recent years considerable attention has been devoted to the study of leptospiral jaundice, including investigations with respect to immunisation with vaccines and the production of antileptospiral serum. In addition to these studies investigations have also been carried out regarding the value of certain synthetic substances for the treatment of malaria. It has been found that soluseptasine and prontosil have definite antimalarial action at least on *P. knowlesi* infections in rhesus monkeys, when administered in disproportionately large doses as compared with the dosage for human beings, but that they do not possess any advantage over the drugs already in use. Another synthetic compound, cilional or certuna, was also investigated.

The possibility of extraerythrocytic development of the malarial parasite in the monkey is being investigated with bone-marrow obtained by tibial puncture during life and smears from the spleen and liver taken shortly after death.

Department of Pharmacology.—The main researches carried out in this department have been summarised under "The Indigenous Drugs Enquiry" on page 153 in the section relating to the Indian Research Fund Association.

---

*Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases, 1938. Available, without payment, from the Director, School of Tropical Medicine, Calcutta.

Department of Bacteriology and Pathology.—The main research work of the department related to cholera and a summary of this work is given on page 32. Standardisation work on the testing of prophylactic cholera vaccines was completed and the results obtained indicate the necessity for proper control of such products in India.

In connection with epidemic dropsy the rôle of argemone oil in the causation of the disease was investigated and an important finding was recorded that, by heating an adulterated oil until it fumed, it can be rendered non-toxic to animals.

Department of Entomology.—Malaria was the chief subject of research in this department. In regard to the coastal malaria of Bengal and Orissa, the conclusion reached is that the coastal lagoons are malariagenic inversely to the stage of their development and that the shutting off by bunds of the flood water from the brackish rivers saves the people from malaria. In Ambootia Tea Estate near Kurseong control of malaria by the shading of breeding places with jungle cover has proved a remarkable success and the spleen index, which was previously 55 per cent., has now been reduced to 5 per cent. Other studies included work on the bionomics of *A. stephensi*, some interesting observations on the use of fish in the control of malaria in Bengal and a study of the habits of domestic flies in relation to disease.

Department of Chemistry.—Eleven Indian medicinal plants were under investigation during the year. The chemical data relating to 780 plants for the projected book "Poisonous Plants of India," were also collected.

Department of Public Health Laboratory Practice.—This department took an active part in the investigations carried out at the School regarding the rôle of argemone oil in the causation of epidemic dropsy.

Department of Anæmia Research.—A relationship has been shown to exist between the hæmolytic type of tropical macrocytic anæmia, chronic malarial infection and dietary deficiency. Different liver fractions are being used in the treatment of this macrocytic anæmia with the object of identifying the deficient factors.

An investigation on anæmia in Assam has shown that the diet of the anæmic coolies was deficient in calcium and vitamin C amongst other things. So far it has not been found that the addition of calcium to the diet of anæmic patients will cause any improvement in the blood picture or even help to increase the response to other hæmatinics. The ascorbic acid saturation of both anæmic and other patients admitted to the hospital was investigated.

A unit from this department also investigated pneumonia in a manganese mine at Shivarajpur in Bombay Presidency. There was evidence that a high incidence of malaria played some part in the causation of pneumonia.

Department of Helminthology.—It has been shown that a dose of two to three grains of santonin is as effective as the usually recognised dose of five grains, so that it is possible to reduce the cost of the treatment by one half.

An interesting filarial parasite from a human being was received for identification and study. It proved to be a new parasite as far as human beings are concerned but, in the absence of male specimens, an exact classification was not possible.

Other important researches carried out in this institution have been described under the various heads in the section relating to the Indian Research Fund Association.

Haffkine Institute, Bombay.*

66. The manufacture of a large quantity of prophylactic vaccines such as cholera vaccine, typhoid vaccine and antirabic vaccine, and diagnostic work for hospitals largely monopolised the attention of the Institute. As the only medical research laboratory for the province, the Director stressed the importance of associating the Institute with the conduct of field epidemiological studies in collaboration with the Provincial Public Health Department. How valuable such association can be was demonstrated during the year by an enquiry into the incidence of typhoid fever in the city of Bombay in which the municipal health authorities and the Institute cooperated. Facilities for the laboratory diagnosis of suspected typhoid cases were made available, free of charge, to all medical practitioners. One of the consequences of this was that notification of the disease in the city showed considerable improvement. For the previous five years the number of reported cases and deaths from typhoid fever were 1,959 and 1,349 respectively, with a case mortality rate of 69 per cent. This unduly high rate suggests that many mild cases of typhoid failed to be notified; on the other hand, during the year under review, because of the increased notification of cases, the mortality rate fell to 9·3 per cent, which is in agreement with the experience elsewhere.

Further light was also thrown on the mode of spread of the disease. The city water supply was excluded as the source of infection. The basket privies in the unsewered parts of the city, combined with a large increase of flies in the area, were considered to be responsible for the largest number of cases. The results of this cooperation between the laboratory and the health authorities in Bombay were so gratifying that it is reported that the Government of Bombay have under contemplation a permanent scheme for making available to medical practitioners laboratory aid in the diagnosis of cases of infectious disease free of charge.

The main researches carried out at the Institute related to plague. They have been summarised at page 35 of this report. The studies on the antimalarial drugs, plasmochin and atebrin are given on page 158.

Other researches included studies on the average hæmoglobin content of the blood of normal Indian subjects, and these show that the averages among Indians are similar to those obtained in America for white American subjects. An investigation of the blood urea content in Indians showed that while it lies within the same limits as those of American subjects, the normal excretion of urea of Indians is only about half of that of Americans. This subject is under investigation.

The antirabic department of the Institute has shown increased activity, the number of treatments issued during 1938 being 11,479 against 9,750 in 1937.

---

*Report of the Haffkine Institute, Bombay, for the year 1938. Obtainable from the Superintendent, Government Printing and Stationery, Bombay, or through the High Commissioner for India, India House, Aldwych, London, W. C. 2, or through any recognised bookseller. Price As. 3 or 4*d*.

King Institute of Preventive Medicine, Guindy.*

67. The Institute continued to be the main centre of medical and public health research in Madras Presidency, in addition to its general function as a bacteriological laboratory for the purpose of clinical, bacteriological, serological and pathological diagnoses for all Government hospitals.

The research work carried out at the Institute included investigations on cholera, filterable viruses including vaccinia and sandfly fever viruses, endemic fluorosis and the different species of algæ met with in the various types of water supplies of the province.

The researches on cholera are described on pages 32 and 33 of the report, while the other researches which were carried out under the auspices of the Indian Research Fund Association have been described in the section relating to that body, page 148.

Vaccine lymph.—During the year, 23,135 grammes of crude lymph were manufactured, the average yield per calf being 28.6 grammes compared with 27.6 grammes last year. Details regarding vaccine lymph and vaccinations will be found in section VI of this report.

Bacterial vaccines.—The total issue of cholera vaccine amounted to 1,373,488 doses compared with 2,389,071 issued during the previous year. The reduction was due to the absence of severe epidemics of the disease in the province.

In regard to T. A. B. vaccine the Provincial Government sanctioned concession rates of purchase to municipalities and educational institutions and, in consequence, the total issue increased from 55,594 doses in 1937 to 61,536 doses during the present year. There was also an increase in the issue of therapeutic sera from 96,066 doses in 1937 to 170,614 in 1938.

The Public Health Section.—The public health section is concerned with the examination of water supplies. The number of samples examined during the year was 9,890, an increase of 1,200 samples over that of the previous year. In addition, this section did the chemical examinations in connection with enquiries on endemic fluorosis and algal problems. Another important investigation was the large scale experiment carried out at Trichinopoly in 1937 and 1938 for the chlorination of water using a uniform minimum dose of 0·1 parts per million all the year round with vigorous agitation of the water immediately after the addition of chlorine. It has been found that with this method samples drawn from several points in the town distribution system consistently showed the absence of lactose fermenters in 60 c.cs. of water. The quantity of chlorine used is minimal and this method eliminates the necessity for frequent laboratory control of the dose required for sterilisation. The method is also economical as the cost of chlorine is reduced by 40 to 80 per cent.

Another important advance in regard to water supplies was the inauguration of a scheme by which District Health Officers could have samples from rural supplies examined at the Institute expeditiously, telegraphic reports being sent to these officers within 24 hours of the receipt of the samples at the Institute.

---

*Report of the King Institute of Preventive Medicine, Guindy, for the year ending 30th September 1938. Obtainable from the Superintendent, Government Press, Madras. Price 8 annas.

King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong.*

68. Details concerning the antirabic section of the Institute are given on page 164.

As in former years research on cholera continued to be one of the most important activities of this Institute. A brief description of the work accomplished during the year is given on page 32.

Vaccine Section.—During the year 1,968,568 c.cs. of cholera vaccine were issued. This amount is more than double that of the previous year and resulted from a cholera epidemic in Sylhet district. Twelve thousand three hundred and nine c.cs. of T. A. B. vaccine and 1,160 c.cs. of influenza vaccine were also issued during the year.

Bacteriophage Section.—The total issue of bacteriophage during the year amounted to 495,872 ampoules of 2 c.c. each. An interesting feature is the increased supply to other Governments, the supply during 1938 being double that of 1937.

Assam Medical Research Society.—The work of this society has been reviewed in a later paragraph relating to researches under the Indian Research Fund Association at page 149.

INDIAN RESEARCH FUND ASSOCIATION

69. The following is a brief summary of the investigations financed during 1938. Full details will be found in the Report† of the Scientific Advisory Board, in papers published in the Indian Journal of Medical Research and its Memoirs, in the Journal of the Malaria Institute of India, the Indian Medical Gazette and other journals. A detailed list is given in the appendix to this section (page 235).

Cholera.

70. For all researches on cholera reference may be made to pages 31 to 33 where they are described in the section dealing with that disease.

Malaria.

71. *Malaria Institute of India, Kasauli*‡.—The old name of the "Malaria Survey of India" was changed to "Malaria Institute of India" and that of the "Records of the Malaria Survey of India" to "Journal of the Malaria Institute of India" with effect from 1st April 1938.

---

*King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong.—The Twenty-Second Annual Report for the year ending 31st December 1938. Assam Government Press, Shillong.

†Report of the Scientific Advisory Board for 1938, obtainable from the Secretary, Indian Research Fund Association, New Delhi, Price. Re. 1.

‡Annual Report of the Malaria Institute of India, Kasauli, for the year 1938. Manager of Publications, Civil Lines, Delhi. Price Re. 1 as. 6 or 2*s*.

(*a*) *Classes and instructional work.*—The annual malaria class held at Karnal was attended by 20 students of whom 17 passed the examination. A course on malaria control was conducted for sanitary inspectors and on insect collection for unpaid apprentices. Four numbers of the Journal of the Malaria Institute of India and five health bulletins were published during the year.

(*b*) *Routine entomological work.*—Expert identification of mosquitoes and sandflies was carried out as in previous years.

(*c*) *Antimalarial operations in Delhi.*—These operations were supervised by the officers of this Institute. An important advance has been the employment of various forms of oil booms in the Western Jumna Canal and Najafgarh Cut. The reduction in malaria was marked but its permanency cannot be proved until the antimalarial measures have been subjected to the test of a normal or excessive monsoon. The rains in 1938 were well below average.

(*d*) *Field researches.*—These included observations on the bionomics of *A. culicifacies* at Karnal, the incrimination of *A. stephensi* as the principal and probably sole carrier in Bahrein Islands and investigations in the Wynaad, in the United Provinces Terai and in Delhi. In the Wynaad *A. fluviatilis* has been shown to be the principal vector. Every aspect of the malaria problem in this area is being studied for the purpose of formulating practical control measures. In the Terai a study of malaria among the indigenous and immigrant population has been in progress together with detailed observations on the bionomics of the carrier species of mosquitoes. Investigations in Delhi included the experimental spraying of dwellings to destroy adult mosquitoes. While the low level of transmission of infection owing to the failure of the monsoon prevents a correct assessment of the beneficial effect of this measure, the practicability of its application under rural conditions in this part of India has been demonstrated and this measure is likely to prove a valuable weapon in dealing with epidemics.

(*e*) *Laboratory researches.*—These included a study of monkey malaria, using the extra-abdominal spleen technique, for the purpose of elucidating the factors influencing the numerical increase and decrease of parasites; a series of precipitin tests by Barber's technique to determine the blood preferences of mosquitoes collected during field investigations in U. P., Madras Presidency, Karnal and Delhi; tests to determine the efficacy of certain drugs claimed to be of value in the treatment of malaria and examination of the value of a number of proprietary insecticides.

Malaria transmission enquiry at the School of Tropical Medicine, Calcutta.—Experiments were carried out to study the longevity of *A. annularis* and its power of transmitting infection under varying conditions of temperature and relative humidity. The effect of various antimalarial drugs upon the infectivity of man to mosquitoes was under investigation. The chemotherapy of antimalarial drugs in general in relation to human and monkey malaria was also studied. A new species of bird malaria (*P. heroni*) was described.

Assam Medical Research Society (Malaria Section).—The main activities of the Society included (*i*) an eight weeks' training class in malariology for medical licentiates and a four weeks' course for malaria inspectors; (*ii*) three malaria surveys; (*iii*) supervision of a number of antilarval control centres;

(*iv*) the continuance of the Doom Dooma cinchona-plasmochin treatment experiment for the sixth year; in 1932-33, spleen and parasite rates of children between two and ten years old were 56.5 and 40 per cent respectively while in 1937-38, the corresponding figures were 14·6 and 13·5, and (*v*) further studies of the cold weather bionomics of *A. minimus* in the plains of Assam.

Blackwater fever enquiry; vitamin C and malaria at the All-India Institute of Hygiene and Public Health.—This has been described at page 141 under the enquiries at the All-India Institute of Hygiene and Public Health, Calcutta.

Nutrition

72. *Nutrition Research Laboratories, Coonoor.*—The systematic survey of Indian foodstuffs was continued and by using electrocardiographic methods the vitamin B content of a number of foodstuffs was investigated. The biological value of the proteins of some 30 common foodstuffs was determined. Methods of improving Indian diets continued to be investigated, special attention being given to diets largely composed of tapioca, such as are consumed in certain parts of South India. The effect on monkeys of long continued feeding on diets resembling certain types of Indian diets was studied. Investigations were also continued on the pathology of the skin and nervous system in relation to dietary deficiency. Other researches included a study of the changes in the unaffected parts of the stomach and duodenum occurring in human cases of peptic ulcer and an investigation into the relation between vitamins and enzyme activity during the processes of oxidation and reduction in the tissues. A number of dietary surveys was carried out in different parts of India and the information collected should prove to be of great value to public health and agricultural departments. Controlled diet experiments carried out in two schools have shown that the addition of calcium lactate definitely improves the poor South Indian diet. A study of the rice problem showed that the consumption of highly milled rice was rapidly spreading. A considerable amount of information on the subject was collected by means of questionnaires and field enquiries.

Additional nutrition enquiry at the Imperial Agricultural Research Institute, New Delhi.—The programme of work of the Liaison Officer between human nutrition and agricultural research at the Imperial Agricultural Research Institute, New Delhi, included (*a*) collection of evidence from medical and public health workers regarding the state of nutrition of villagers and townspeople, (*b*) survey of the quantities of food produced in various provinces in relation to the dietary requirements of the population, (*c*) animal experiments on the nutritive value of pulses as supplement to a diet based largely on cereals and (*d*) animal experiments on the value of calcium and phosphorus as supplements to the poor South Indian diet.

Enquiry on cheap well balanced diets under the Bombay Presidency Baby and Health Week Association.—The enquiry into cheap well balanced diets was continued on groups of boys at different ages, two types of diets being used. Growth tests on albino rats were carried out with various foodstuffs and in different combinations, the conclusion arrived at being that fresh whole milk gave the best result. The foodstuffs studied were whole milk, skimmed milk powder, red palm oil, soyabeans, butter and vitamin D.

Investigation of basal metabolism in children and adults in the Bombay Presidency at the Seth G. S. Medical College, Bombay.—The basal metabolism of 24 men and 52 women in Bombay was investigated. On the basis of the results obtained the daily average caloric requirements for men and women were found to be 2,600 and 1,900 calories respectively.

Ascorbic acid enquiry at the University College of Science and Technology, Calcutta.—The investigations on vitamin C included the following :—

(*i*) its effect on toxins ;

(*ii*) the effect of minute amounts of the vitamin on the growth of certain bacteria and fungi ;

(*iii*) a comparison of the relative efficiency of two methods of assessment of vitamin C subnutrition, the saturation test of Harris and Ray and an intra-dermal skin test with 2 : 6 dichlorophenol indophenol.

(*iv*) isolation of ascorbigen or combined ascorbic acid in plant and animal tissue ;

(*v*) development of a method of estimating total vitamin C comprising free ascorbic acid, dehydro-ascorbic acid and ascorbigen ; and

(*vi*) a study of the relationship between vitamin C and luteinising and follicular hormones which showed that luteinising and follicular hormones, on injection into normal guineapigs, do not alter appreciably the vitamin C content of tissues like the liver, spleen, kidney and small intestine.

Studies in human metabolism at the Dacca University.—The physiology of human nutrition, with special reference to the requirements of proteins, calcium and phosphorus for the metabolism of Indians, was under investigation.

Enquiry into the etiology and pathology of peptic ulcer in South India.—The main conclusions of this enquiry are (1) that the condition is 60 times more common in South India than in North India, (2) that the highest incidence in South India is in the centre and north of Travancore and (3) that lack of proteins and of vitamins A and B in the South Indian diet is the direct cause of the high incidence of peptic ulcer. It is suggested that these deficiencies in the diet affect the nutrition of the intra-mural ganglia which control the movements of the stomach and the secretions and maintain the balance between sympathetic and vagal influence. The failure of the myenteric plexus to perform its normal function leads to a condition of vagal preponderance resulting in pylorospasm, hyperperistalsis and hypersecretion, while the dietetic deficiency lowers the resistance of the gastric mucosa to infection, leading to lymphocytic infiltration and follicular hypertrophy. In the more advanced cases the follicles become abscesses which rupture on to the mucosal surface and become minute ulcers. Healing of these ulcers is prevented by hypersecretion, hyperperistalsis and pylorospasm and, in course of time, the minute ulcers coalesce to form a large chronic ulcer.

Other researches included (*a*) an investigation of the working efficiency of Indian labourers at the King George Medical College, Lucknow, (*b*) an enquiry into malnutrition among Bengalee boys with regard to vitamins B and C at the Presidency College, Calcutta, (*c*) researches on calcium deficiency in the Kangra Valley (Punjab), (*d*) an investigation regarding protein, fat, ionisable iron

content and total mineral content of 30 different varieties of fish at the University College of Science and Technology; Calcutta and (*e*) an enquiry into calcium metabolism in health and disease at the Seth G. S. Medical College, Bombay.

Leprosy and Plague.

73. Researches on leprosy and plague have been briefly summarised on pages 61 and 35.

Rabies

74. *Antirabic vaccine enquiry at the Pasteur Institute of India, Kasauli.*—The investigation into the value of antirabic serum as an adjunct to treatment with a carbolised dead vaccine was continued. At the Pasteur Institute, Kasauli, 1,405 cases were treated with serum and vaccine and 716 cases with vaccine alone. The numbers of deaths corresponding to these cases were 23 and 17, giving rates of 1·64 and 2·37 per cent. Among 2,234 cases treated with serum and vaccine in certain selected centres in the Punjab and the United Provinces the death rate was 1·79 per cent and among 4,971 cases treated with vaccine alone the rate was 1·25 per cent. In Kasauli, the death rate for the cases receiving vaccine alone was slightly higher than among those receiving both vaccine and serum while, at the selected centres in the two provinces, the higher percentage of mortality was among those receiving serum in addition to the vaccine. It may, however, be pointed out that, in respect of both, the differences in the mortality rates are not statistically significant. No evidence has therefore been produced in favour of the serum as an adjunct to treatment. Other researches included unsuccessful attempts to culture the fixed rabies virus on embryonic chick brain, experiments to test the value of monkey brain vaccine, which showed that carbolised vaccine of this type is not superior to carbolised sheep vaccine and experiments to determine the duration of immunity after a course of antirabic inoculations. Periods of 7½, 8½ and 9½ months after treatment were tested, monkeys being used for the experiments. None of the treated animals developed rabies while 33⅓ per cent of the controls developed the disease.

Tuberculosis

75. *Tuberculosis enquiry at the All-India Institute of Hygiene and Public Health, Calcutta.*—The enquiry has been described at page 142 under the researches carried out at the All-India Institute of Hygiene and Public Health, Calcutta.

Enquiry into the incidence of positive Mantoux reactors and latent tuberculosis in medical students, nurses and others at Lahore.—1. A positive Mantoux reaction was obtained in 53 per cent of 434 medical students at Lahore, the figure rising to 70 per cent and 80 per cent in the 4th and 5th year students.

2. Mantoux positive reactions were found in 77 per cent of the 53 nurses examined.

3. Of the 400 skiagrams taken of students, 18 or 4·5 per cent showed evidence of healing or healed adult phthisis. These cases are being observed clinically and radiologically, but none of them have developed into the active " open " case with positive sputum. It is hoped to observe these " latent " cases over a number of years.

Tuberculin survey of school children and young adults in Amritsar.—A group of 2,451 school children and young adults was investigated. An examination of the results when classified according to age groups and

into two community groups, Mohammadans and Hindus and Sikhs (the two latter being a combined group) shows that the proportions of the positive reactors in the two community groups closely corresponds at individual age periods and that the proportion steadily rises as age advances. Total positive reactors among Mohammadans were 57·3 per cent and among Hindus and Sikhs 55·7 per cent. Among Mohammadans the percentage of positives at different age periods rose from 39·7 in 1—5 years to 80·7 in 20—25 while for Hindus and Sikhs, the corresponding figures were 33·3 and 81·6. A similar investigation among the members of 462 families in Amritsar city showed that, for Hindus and Sikhs, the percentage of positive reactors increased from 27·3 per cent at 2—3 years of age to 100·0 per cent in the age group 20-25. For Mohammadans the corresponding percentages were 17·0 and 76·1.

Indigenous Drugs

76. *Indigenous drugs enquiry at the School of Tropical Medicine, Calcutta.*— The chemical composition and pharmacological action of the glucosides, alkaloids or other active principles isolated from a number of medicinal plants were under investigation. These plants included *Periploca aphylla, Tylophora asthmatica, Holarrhena antidysenterica* and *Rauwolfia serpentina, Antiaris toxicaria, Cerbera odallum, Hemidesmus indicus, Entada scandens, Baringtonia acutangula, Lasiosiphon eriocephalus, Solanus trilobatum, Bambosa arundinacea, Hydrocotyl asiatica* and *Phodomytus tomentosa.*

A herbarium of medicinal plants growing in India is being collected and it now comprises about 5,000 specimens relating to 1,500 species of plants. This herbarium, when completed, will be a unique collection and will be of immense value for obtaining authentic specimens of plants for chemical and pharmacological studies.

Another investigation relates to the study of poisonous plants in India. Much useful information, botanical, chemical and pharmacological, has already been collected and is now ready for publication.

Investigations, both therapeutic and biochemical, have been carried out on the snake venoms which are used in the indigenous systems of medicine. It has been shown that cobra venom is useful for the relief of pain of malignant disease, of rheumatic origin and of nerve leprosy. Daboia venom by intramuscular injection appears to have some effect in controlling internal hæmorrhage. A comparative biochemical study has been carried out of the venoms of the cobra and Russell's viper. The viper venom has a higher proteolytic power than cobra venom. An active lecithinase is present in both venoms. Cobra venom is hæmolytic in varying degrees for susceptible varieties of red blood corpuscles but viper venom is hæmolytic only to a limited extent.

Other studies included an enquiry into the prevalence of opium smoking in India. The habit of opium smoking has greatly declined in the country during the past 30 years, although it is still widely prevalent in Assam and the Central Provinces and to a smaller extent in many of the larger towns of India. The main causes of addiction were association with other addicts, disease or minor ailments, hard work or worry. In a series of 300 cases the dose of opium ranged from 1 to 180 grains daily. Various chemotherapeutic and pharmacological investigations were pursued. Among the chemotherapeutic substances investigated was a series of dextro-rotatory derivatives of cinchona alkaloids, which were synthesised in this laboratory and were being studied in regard to their pharmacological action. The effects of varying doses

of different antimalarial drugs on the infectivity of the patient to the mosquito were also investigated. The drugs used were cinchona febrifuge, quinine sulphate, malarcan, tebetren, atebrin, plasmochin, gametochin and cilional (certuna). Plasmochin in a dose of 0·02 gm. prevents the development of crescents in *A. stephensi* and cilional in a dose of 0·36 gm. The other substances had no effect.

Indigenous drugs enquiry at the K. E. Medical College, Lahore.—Investigations were carried out on *Rasaut, Mamiri, Hing, Cassia Tora, Rasna, Aruni* and *Centauria Behen.*

Maternal Mortality

77. *Urban statistical enquiry into maternal mortality and morbidity in child birth, Bombay.*—Three hundred and forty deaths directly due to childbearing were investigated in Bombay. Sepsis was found to account for more than one third of the total and was the major cause of deaths. Anæmia stood second in importance. Toxæmias of pregnancy were responsible for the next largest number of deaths, followed by puerperal hæmorrhage.

Anæmia and eclampsia enquiry in Calcutta.—Cases of anæmia in pregnancy were examined and followed up till their blood picture returned to within normal limits. Bloods of normal pregnant women as well as of non-pregnant girls and women were also examined for comparison.

Enquiry into anæmia of women in Assam at the School of Tropical Medicine, Calcutta.—The results of an investigation into the anæmia of pregnant tea-garden coolie women in Assam show that they have on the whole a low level of hæmoglobin associated with a small pale red blood cell. Iron deficiency brought about by continuous blood loss from hookworm infection in the presence of a low iron intake, is stated to account for this in part, but not altogether. It is considered possible that a low calcium and/or a low vitamin C intake may be associated factors.

The anæmia amongst pregnant women can be divided into two groups, characteristically microcytic hypochromic and macrocytic hyperchromic respectively. The former is an exaggeration of the anæmia in the normal population brought about by the extra demands of pregnancy, but the factors concerned in the latter are not quite so evident, though the response to treatment suggests—and a dietary survey does not negative the suggestion—that there is a relative deficiency in important food factors probably associated with the vitamin B_2 complex. Other observations indicate that this deficiency is conditioned by the presence of the foetus with its extra demands for substances essential for hæmopoiesis (or less probably its toxic influence) and/or by a state of chronic malaria.

Whilst characteristic examples of each type of anæmia are seen, they seldom occur in the ' pure ' state and in the vast majority of cases deficiencies of both groups are evident.

An experimental study on monkeys was started for the purpose of investigating the anæmia produced by repeated losses of blood, the counterpart of hookworm anæmia, by nutritional deficiency and by malaria severally and in different combinations. Work has been in progress in order to establish normals for comparison and particularly to watch the effects of captivity on the blood picture. Further, an attempt was made to produce, by the administration of the faulty diet that Dr. Lucy Wills advocated, the typical macrocytic picture which she claimed to have produced. There was no success.

Enquiry into toxæmias of pregnancy at the Seth G. S. Medical College, Bombay.—A detailed clinical and biochemical study of eclampsia cases was in progress during the year.

Investigation of the biochemical and dietetic factors concerned in the toxæmia of pregnancy at the K. E. Medical College, Lahore.—Twentyone cases of toxæmia of pregnancy were studied, seven of which were clinically eclamptic. The diets of these patients and of 25 controls were also investigated. Hypoproteinæmia was present in all the cases studied, a greater diminution being present in eclamptics than in cases of nephritic toxæmia. Blood cholesterol was higher in the toxæmia cases than in the normal pregnant controls. Hæmoglobin was consistantly low in all toxæmic cases, as compared with the controls. There was no significant alteration of blood sugar in the toxæmic cases. Subnormal urea clearance with oliguria was present in cases of eclampsia only during the acute phases of the disease. Blood calcium was lower in the eclamptics as compared with the normals.

Enquiry into the hæmatological standard of healthy Indian women at the Lady Hardinge Medical College, New Delhi.—Specimens of blood from a hundred healthy females, who were residents of Delhi, were examined for the purpose of establishing hæmatological standards for Indian women. The mean values for red cell count, hæmoglobin content and cell volume were 4,560,000 per c. mms., 13·11 gms. per 100 c.cs. and 39·04 c.cs. per 100 c.cs. of blood respectively.

A preliminary survey for the investigation of the bacteriology of the genital tract at the Lady Willingdon Hospital, Lahore.—This investigation was carried out during the stage of pregnancy and the puerperium in all emergency cases admitted to hospital and was confined to the identification of streptococci. Work was also done in connection with throat swabbing and isolation of Beta hæmolytic streptococci, throat swabbing of the staff and students, blood culturing of cases of post-partum pyrexia and investigation of the methods of isolation of anaerobic streptococci.

Miscellaneous

78. *Helminthological enquiry at the School of Tropical Medicine, Calcutta.*—(*i*) Intestinal worms from 100 stray dogs were collected in Calcutta with a view to finding the extent to which *Taenia ovis* is present in dogs in India.

(*ii*) A new substance was discovered for the preservation of hookworm eggs in stools and a prolonged trial of its value was being carried out.

(*iii*) The curative effect of large doses of iron on trichuris infection as reported by other workers was under investigation.

(*iv*) The life history of *gnathostoma spinigerum* was found to follow the same lines as reported from Thailand. The immunity of certain species of fish in Bengal to this infection may explain the rarity of human infection here.

Medical mycology enquiry at the School of Tropical Medicine, Calcutta.—The main lines of investigation were as follows :—

(*i*) Work on the testing of fungicides was continued.

(*ii*) An outbreak of microsporon infection in the hair of children in a boarding school was investigated.

(*iii*) The aetiology of cheiropompholyx of the hands was studied in order to decide its connection with ringworm of the feet.

(*iv*) Three supposed virus diseases of the skin, herpes, molluscum contagiosum and infective warts were studied from the point of view of preparation of the specific antigen for each disease and of investigation of the formation of specific antibodies in cured cases.

Dracontiasis and filariasis enquiry at the School of Tropical Medicine, Calcutta.—Field work on dracontiasis was carried out in the endemic areas of the districts of Vizianagram, Trichinopoly, Ramnad and Madura. An antigen was prepared by a special technique for the complement-fixation test in guinea-worm infection and a limited trial has shown that persons harbouring the worms gave uniformly positive results while persons, who did not harbour the worm or from whom the worm had been removed by extraction, gave negative results. This guinea-worm antigen gave negative results with complement-fixation tests on a series of carriers of *W. bancrofti* infection and of cases of elephantiasis.

As regards filariasis, a survey was carried out in Patnagarh (Orissa), an area with a high incidence of *M. malayi* infection. All attempts to obtain the adult worm were without success. Sternal punctures carried out on *W. bancrofti* carriers showed that the microfilariæ occurred in the bone marrow only during the night and was absent from it during day time. Pectine, a well-known coagulant, has been found to be very useful in the treatment of chyluria, the urine in all the cases treated becoming clear in two or three days. Several new drugs, cuprion, surfen, cilional and sdt-561 of Bayer, Synthalin B, May & Baker 693 and Ext. rawalfia liq., were used on cases with *W. bancrofti* infection. None of them had any lethal effect on the parasite.

Protozoal parasites enquiry at King Institute, Guindy, Madras.—The main lines of research were :—

(*i*) the development of *Babesia gibsoni* in *Hœmaphysalis hispinosa* ;

(*ii*) investigations on the toxoplasma of the sparrow ;

(*iii*) investigations on the hæmogregarine of *Calotes sp.* and of the Gecko *Hemidactylus gleadovii* ;

(*iv*) studies on the infectivity of *Leishmania donovani.*

(*v*) introduction of *Trypansoma lewisi* infection in albino rats ; and

(*vi*) miscellaneous work such as the breeding and supply of specimens of the tick *Hœmaphysalis bispinosa* to workers in India and abroad, collection of various ticks and sandflies in Madras and their identification and the maintenance of the cultures of various blood flagellates.

Typhus enquiry at the Pasteur Institute of India, Kasauli.—The three typhus strains, two of the XK and one of the X19 serological types, which were being maintained were in their 65th, and 166th generations. It was reported last year that the tropical rat-mite *Liponyssus bacoti*, the tick *Hyalomma aegyptium* and the flea *Xenopsylla cheopis* can transmit typhus XK under experimental conditions. In view of these findings and of the fact that *T. deliensis*, which is already suspected as the vector in Malaya is found to attack man in the Simla Hills, a thorough study of this tick was undertaken. Its life history was successfully worked out for the first time in India and transmission experiments with laboratory bred larvae were undertaken. Other studies included the possible rôle of *cimex lactularius* in the transmission of typhus X19 (murine). The results were negative. Hares, birds and rats

were studied as possible reservoirs of typhus XK infection. In regard to rats there is evidence to suggest that, in India as in Malaya, these may serve as reservoirs of infection.

Enquiry on filterable viruses at the King Institute, Guindy.—Researches were continued on the dengue fever virus and on vaccinia virus. As regards dengue fever, the virus has already been cultivated in this laboratory on the chorioallantoic membrane. The virus was found to persist in the blood of convalescents for 40 days and the presence of neutralising antibodies was also demonstrated. Dengue fever convalescent serum does not neutralise the sandfly fever virus.

A strain of variola virus, which after initial passage in monkeys had been stabilised by 42 passages in calves, was chosen for comparison with vaccinia virus. Cross agglutination, cross precipitation and cross complement fixation tests revealed no differences between the passaged variola strain and vaccinia virus. Protection tests also confirmed the above findings.

Epidemic Dropsy enquiry (laboratory section) at the School of Tropical Medicine, Calcutta.—Experiments were carried out on human volunteers to establish the association between the presence of argemone oil in mustard oil and the occurrence of epidemic dropsy. It is stated that the consumption of this adulterated mustard oil produces symptoms which cannot be distinguished from those occurring in epidemic dropsy. Animal feeding experiments were also in progress. The toxic effects of protopine, which was isolated from *Argemone mexicana* plants, were under investigation.

Epidemic Dropsy enquiry (field section) at the All-India Institute of Hygiene and Public Health, Calcutta.—Samples of mustard oil, which were incriminated on epidemiological grounds were collected from seven different centres in Bengal. Biological, chemical and physical experiments were carried out and simple differential tests have been developed for the presence of argemone oil in mustard oil. A white crystalline substance has been isolated from argemone oil and it satisfies, in high dilution, all the differential physical and chemical tests for this oil.

Kala-azar enquiry at the School of Tropical Medicine, Calcutta.—Studies in the bionomics of sandflies were continued in a village near Calcutta and data were collected regarding the incidence and survival rate of these flies. Therapeutic trials were carried out with solustibosan and a new pentavalent compound from Messrs. Parke Davis & Co. Sternum puncture was found to be a reliable method of diagnosis, although falling just short of spleen puncture in respect of accuracy.

Investigations of toxicological and medicolegal importance at the Medical College, Calcutta.—Postmortem investigations were carried out on the lead content of normal human tissues. Lead was found to be absent in the ovaries of six healthy women while in respect of another woman, with a history of exposure to lead poisoning, the ovaries contained 0·17 mg. of the substance.

The lead content of the common foodstuffs and of water supplies was also investigated. The lead content of Calcutta tap water and of wells and tanks in the suburbs of the city does not exceed 0·002 mg. while that of Glasgow is about 15 times higher (0·03). An outbreak of cattle poisoning was studied and hydrocyanic acid was detected in the stomach contents and viscera of some of these animals. The source of this poison was traced to feeding on the

flowering tops of the common linseed plant. Another investigation was that into the copper content of normal human tissues. It would appear that fœtal tissues show a special affinity for copper.

Studies on bone-marrow, etc., at the Carmichael Medical College, Calcutta.—Postmortem specimens of bone-marrow were studied by histological examination. These specimens related to persons dying from various diseases.

Enquiry into secondary anæmias at the Carmichael Medical College, Calcutta.—Complete hæmatological examinations were carried out in cases of anæmia of various causes and types. Further, the euglobulin and pseudoglobulin as well as the ester and free cholesterol fractions in the blood of cases of idiopathic anæmia of pregnancy and of normal pregnancy were determined. Therapeutic investigations based on the biochemical findings were also carried out on white rats.

Enquiry into thrombo-angeitis obliterans at the Seth G. S. Hospital, Parel, Bombay.—With the object of studying the clinical manifestations of the disease, of assessing the importance of various exciting factors and of estimating the extent of arterial damage 29 cases were studied in detail. The pathological investigations included a detailed study of the various arteries of the body in a case that died and a routine examination of the arteries, veins, lymphatics and nerves of amputated limbs. The blood chlorides and excretion of chlorides in the urine were also investigated. Blood cholesterol and blood sedimentation rate were also studied. Hypertonic saline is stated to have a definite beneficial effect because, even after a single injection, there is considerable relief of pain.

Pharmacological investigation of oroxylin at the Seth G. S. Medical College, Bombay.—Oroxylin was extracted from the root bark of Oroxylum Indicum Vent., which is a root used in the ayurvedic system of medicine. It was found that the drug possesses only a slight depressant action on plain and voluntary muscular tissue.

Pharmacological enquiry at the Haffkine Institute, Bombay.—It has been shown that when plasmochin is administered, in doses equivalent to therapeutic doses in man, to female guineapigs at different stages of pregnancy, the placenta acts as a barrier and prevents the drug from passing through to the fœtus except in very small quantities. The offspring of these pregnant guineapigs were kept under observation for two months and their growth and health did not differ from those of normals. These experiments suggest that therapeutic doses of plasmochin to the mother would probably cause no harm to the fœtus. Investigations on the action of atebrin on the uterine movements of non-pregnant rabbits showed that therapeutic doses of this drug had very little effect on the movements of the uterus. On the other hand it was shown that atebrin could pass the placental barrier more easily than plasmochin.

Algæ enquiry at the King Institute, Guindy.—This investigation has been started with the object of studying (1) the seasonal changes occurring in the algal flora of water supplies and their relationship to the chemical constituent of the water and the meteorological conditions of the locality and (2) the influence of algal growths on modern methods of water purification. For this purpose representative samples were studied from the four chief sources of water supply in Madras Presidency, namely, (a) impounded reservoirs on the plains (b) upland surface water (c) rivers and (d) ground waters (for instance, spring or well) both from the point of view of their chemical composition and of the algal growths present in such waters.

Sandfly fever enquiry at the King Institute, Guindy.—The field work included sandfly surveys at Peshawar, field experiments to determine the minimum wind speed against which a sandfly could fly (1·6 to 1·7 miles per hour) and soil disinfestation work at Nowshera. An attempt was made to reduce the number of sandflies in an isolated building by intensive larvicidal measures. A 15 per cent solution of naphthalene in kerosene was liberally used for soil disinfection and the treatment was repeated after six weeks. Thereafter weekly catches of sandflies were made by collectors from this area and from a control area and the results showed no appreciable reduction in the number of flies in the experimental area. The most satisfactory preventive method appears to be the obliteration of all places likely to shelter the developing fly. Work on these lines has been carried out at Landi Kotal and Peshawar for many years past and has resulted in a marked decrease both in the number of sandflies and in the number of cases of the fever.

Experiments carried out by spraying rooms with a 5 per cent. "Lethane" solution by means of a "Phantomyst" atomiser showed that the solution is definitely insecticidal.

Laboratory work included the examination of 180 specimens of serum from sandfly fever patients during both the febrile and convalescent stages. The virus was present in the blood regularly for 7 days and in a few cases even up to five weeks. Serial intraperitoneal and intracerebral passages of the virus through mice failed to increase its virulence. The virus was found to be non-pathogenic to monkeys. The cultured virus was used as a vaccine on human volunteers in order to determine its value as a prophylactic against sandfly fever. The results were inconclusive.

Endemic fluorosis enquiry at the King Institute, Guindy.—The incidence of mottled enamel in the teeth of children and of bone affections in adults was investigated in certain parts of Nellore and Bellary districts in Madras Presidency. Water samples from these areas were examined for their fluoride content. The toxic level of fluorine at which mottling of teeth occurs appears to be in the neighbourhood of one part of fluorine per million parts of water. Seventyfour per cent of the children in the area surveyed showed mottling of enamel, of whom 23 per cent were mild, 20 per cent moderate and 31 per cent severe mottling. Among adults 74·4 per cent showed bone affections, the sex incidence being 75·2 per cent in men and 73·6 per cent in women. Men engaged in pursuits involving light manual labour (clerks, teachers, merchants etc.) showed a smaller incidence of bone lesions than agriculturists and others doing hard manual labour. Judged by length of residence, the incidence of bone affections appeared to be higher in adults who had resided in the area for over 15 years than in those who had resided for a shorter period.

Laboratory experiments were carried out with various chemicals for the removal of fluorides from water. Tricalcium phosphate and defluorite alone appeared to be promising in this respect and further work is in progress.

Snake venom enquiry at the University College of Science and Technology, Calcutta.—Investigations were carried out on (*i*) enzymes in snake venom (*ii*) isolation of the toxic constituents of snake venom (*iii*) action of reducing agents on snake venom and (*iv*) diffusion and cataphoresis of snake venom.

Investigation into the ætiology of infantile biliary cirrhosis with special reference to anæmia at the Medical College, Madras.—Twentyone infants between the ages of six months and two and a half years with hepatic and splenic

enlargement were examined. As there is no single test for differentiating the disease from many other diseases in the tropics causing enlargement of the liver and spleen in children, the study was carried out on a wide basis including blood tests, cultural and microscopic examination of urine and fæces, treatment with insulin and glucose or acetyl-choline or zinc salts etc., on selected patients, attempts to isolate a virus as the etiological factor and investigation of the possible rôle of castor oil in the production of the disease. No findings of importance were reported.

Researches on flies at the School of Tropical Medicine, Calcutta.—The natural and seasonal breeding habits of domestic flies were studied in Calcutta and its immediate outskirts.

Research work in Medical Colleges.

79. A considerable amount of research work was carried out in the different medical colleges of the country and the following paragraph gives a brief summary of these activities.

Seth Gordhandas Sunderdas Medical College, Bombay.—The investigations carried out included (1) a study of balanced diets, (2) basal metabolism in children and adults in Bombay Presidency, (3) pharmacological investigations of oroxylin, (4) thrombo-angeitis obliterans (5) calcium metabolism in health and disease, (6) the toxæmias of pregnancy, (7) the incidence of the different types of pneumococcal infection in Bombay, (8) virulence of *M. tuberculosis* (9) diet surveys in Bombay and (10) a study of spirochætal jaundice and some others.

Medical College, Patna.—The researches carried out at this college included (1) an investigation into the incidence of syphilis in Bihar and its varied clinical manifestations, (2) a study of the chemical structure and pharmacological action of sympathetic stimulants and parasympathetic stimulants, (3) an enquiry into the vitamin C content of some germinated cereals and pulses, and (4) an estimation of manganese content of some Indian foodstuffs.

Medical College, Madras.—Among the researches carried out were included (1) an investigation of the phenomenon of Vi-agglutination on the sera of positive cases of typhoid fever ; (2) biochemical investigations in respect of eclampsia patients ; (3) a study of the epidemiology of infantile cirrhosis of the liver ; (4) an investigation into the etiology and pathology of lymphadenopathies of obscure origin and lymphogranuloma inguinale ; (5) an investigation into the use of dogs for the bioassay of digitalis, which showed that dogs, which are relatively less costly than cats, can be used equally well for this purpose ; (6) a study of the effects of extreme anæmia on the heart and of the " HCL " content of gastric juice in all cases of anæmia ; and (7) an enquiry into the efficacy of gonadotropic hormones in the treatment of whooping cough, which is stated to have confirmed the fundamental rôle of the sex hormones in the causation and prevention of this disease described by investigators abroad.

Grant Medical College, Bombay.—Ultra-violet therapy for two external diseases of the eye, namely, trachomatous keratitis and pannus, is reported to have given encouraging results. Injection of tartar emetic is stated to have favourable results in cases of trachoma. Other researches included (1) observations on the relation of calcium to the clotting time of blood, (2) investigation of fæcal carriers during a typhoid epidemic, (3) work on the suprarenal cortex

in relation to fall of blood pressure after the stimulation of arterioles by substances like pituitrin, (4) studies in hæmolysis, (5) the constituents of blood in health and disease and (6) studies in basal metabolism.

Faculty of Medicine, University of Lucknow.—Mention was made last year of investigations on the pharmacological action of *Mica bhasm.* This piece of research work is reported to have been almost completed and the conclusion drawn is that, though the drug is reported to be of great benefit for chronic bronchitis and asthma, yet animal experiments did not show any antispasmodic or depressant action on the muscles. The drug has also been tried clinically on human patients without relief. In the Ophthalmology Department, investigations on the etiology of glaucoma and spring catarrh were carried out. Other researches were (1) the effects of fats and other articles of diet on the excretion of bile in cases of cholecystostomy and choledochostomy and (2) a detailed study of cases of surgical tuberculosis including the history of patients with special emphasis on dietetic habits, social and economic conditions, the type of tubercle bacillus, residence of the patients with reference to hygienic surroundings and level of subsoil water and source of infection.

King Edward Medical College, Lahore.—The main researches carried out in this institution were those financed by the Indian Research Fund Association and they have been described in the section devoted to the work of the Association.

Medical College, Calcutta.—In the Department of Chemistry investigations were in progress on (1) the influence of dietary carotene on the carotene and vitamin A content and Reichert and Iodine values of butter fat with special reference to seasonal variations, (2) the nutritive value of ghee and its industrial possibilities in Bengal, (3) the toxicology of the linseed plant, (4) a new method for the detection of small quantities of cocaine in the presence of novocaine, (5) the copper content of normal human tissues and (6) the lead content of common Indian foodstuffs. In the Department of Physiology the vital capacity of Bengalees was investigated. The action of carpaine hydrochloride was investigated in the Department of Pharmacology. It was shown to be extremely toxic to *E. hystolytica.* It has but transient effect on the circulatory and respiratory systems and this alkaloid is now being tried for the treatment of amœbic dysentery.

The Department of Pathology published a number of papers of which " Observations on the dysenteric conditions among Europeans in Calcutta " deserves special mention.

The Chest Department of the Medical College carried out investigations on (1) the basal metabolism of pulmonary tuberculosis cases with a view to determining their dietetic requirements, (2) vital capacity in chest diseases and (3) bronchiectasis, its etiology, pathology, diagnosis, prognosis and treatment. In the Department of Ophthalmology investigations were in progress regarding the etiology of superficial punctate keratitis. The Department of Obstetrics and Gynæcology carried out a series of clinical studies on subjects such as ectopic gestation, treatment of puerperal infection, blood pressure in pregnancy, hyperemesis gravidarum and gonococcal vulvo-vaginitis of children in Bengal.

Carmichael Medical College, Calcutta.—Investigations were carried out on (1) the chemotherapy of tumours (2) diabetes (3) cholera and choleraic vibrios and (4) the histopathology of cholera.

PASTEUR INSTITUTES.*

Pasteur Institute of India, Kasauli.

80. The total number of patients treated at the Institute and in 194 centres attached to it was 30,474, an increase of 2,398 compared with the previous year. The vaccine employed for treatment is a carbolised 5 per cent Paris sheep brain vaccine. There were two deaths among the Asiatics treated at the Institute and 68 deaths among Asiatics treated at the centres. Amongst the Europeans treated, three deaths took place. There were four definite cases and one doubtful case of post-treatment paralysis amongst the total patients. They all eventually made good recoveries.

The research work carried out at this Institute during the year under review has been summarised at page 152

Pasteur Institute, Calcutta.

81. The total number of patients who attended the Institute during 1938 was 2,873 compared with 3,008 in 1937, a decrease of 135. On the other hand, the number of courses of treatment issued to the centres attached to the Institute was 6,373, an increase of 681 treatments over that for the previous year. Fortyeight deaths were reported during the year. Of these seven at the Institute and one at a centre arrived with symptoms of the disease. Of the remaining 40 deaths nine deaths took place within 15 days of the completion of the treatment.

Pasteur Institute, Patna.

82. The number of patients treated at the Institute and its 11 centres was 4,971, an increase of 553 over that of 1937. The vaccine used was 5 per cent carbolised sheep brain vaccine, the Paris strain of fixed virus being used for its manufacture.

As in previous years the months of January and July showed a higher incidence of dog bites than the other months of the year. The percentage of bites from jackals is comparatively higher among Asiatics than amongst Europeans, and higher risk appears to be involved in jackal bites than in the

---

*Details of the work of the various Pasteur Institutes mentioned will be found in the following publications :—

1. Pasteur Institute of India, Kasauli—38th Annual Report of Central Committee of the Association and the Report of the Director of the Institute for 1938-39.
2. Pasteur Institute, Calcutta.—Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases for 1938. Obtainable from the Director, School of Tropical Medicine, Calcutta. (*Gratis*).
3. Pasteur Institute, Patna.—The 10th Annual Report of the Pasteur Institute, Patna for 1938. Superintendent, Government Printing, Bihar, Patna.
4. Pasteur Institute of Southern India, Coonoor.—Annual Report of the Director for the year ending 31st December 1938, together with the 32nd Annual Report of the Central Committee of the Association for the year ending 31st March 1939.
5. Pasteur Institute, Bombay.—Report of the Haffkine Institute for the year 1938. Superintendent, Government Printing and Stationery, Bombay.
6. Pasteur Institute, Shillong.—The Twentysecond Annual Report of the King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong for the year 1938.

bites of dogs. More lick cases came for treatment from among Europeans than Asiatics. This shows that there is greater recognition of the danger involved in the lick of a rabid dog among Europeans than among Indians.

The research work carried out at this Institute related to (1) changes in the formed elements of blood subsequent to the completion of a course of antirabic treatment, (2) investigation of cerebrospinal fluid in fixed virus rabies, with special reference to pH. protein content, sugar content and cytology and (3) the effect of the sulphanilamide group of drugs on fixed rabies virus in vitro and in vivo.

Pasteur Institute of Southern India, Coonoor.

83. A total of 12,396 patients was treated at the Institute and in subsidiary centres during the year. Paris virus was exclusively used in the preparation of the vaccine, which is a 5 per cent carbolised sheep brain suspension prepared by Semple's method.

The total number of deaths from rabies among the treated cases (complete and incomplete) was 20 giving a mortality rate of 0·17 per cent. Of these 20 deaths, 8 or 0·07 per cent occurred among the patients who had received the full course of treatment and 12 or 0·49 per cent among those who did not take the complete course. In the latter group seven patients developed rabies while receiving treatment and the other five deaths occurred among persons who left before treatment was finished.

Antirabic treatment for animals is steadily gaining ground. During the year, 40,831 c.cs. of 5 per cent carbolised vaccine were issued for the treatment of animals, chiefly to veterinary hospitals in Madras Presidency and the neighbouring Indian States. The number of animals treated was 561 (of which 478 were dogs) compared with 525 in the previous year. During the sixteen years' period, 1923-38, the total number of animals which had received antirabic treatment was 4,190 and among them 94 deaths took place giving a mortality rate of 2·24 per cent.

The main researches carried out in this Institute were financed by funds from the Indian Research Fund Association and they have been described in the section relating to that Association. Other researches included different methods of cultivating the rabies virus and an investigation of a strain of rabies isolated from a jackal infected in nature. This virus was found to be pathogenic for fowls. By repeated passages this virus was "fixed". This fixed jackal virus was found to be highly pathogenic to other animals. Rabbits and guinea-pigs developed symptoms from 2 to 3 days after inoculation and died within 24 hours of the onset of symptoms. Pigeons developed symptoms of rabies within three days and died on the same day on which symptoms became apparent. These findings are a marked contrast to the results obtained after the inoculation of fowls with the strain of Paris fixed virus used in the preparation of the antirabic vaccine of this Institute. Using the latter strain one fowl died of rabies eight months after intracerebral inoculation and another 11 months after the introduction of the virus by corneal scarification.

Pasteur Institute, Bombay.

84. During the year 3,405 persons applied for antirabic treatment at the Institute of whom 2,740 completed the full course of treatment with a death rate from hydrophobia of 0·1 per cent. A total of 7,739 antirabic treatments was issued to the centres attached to the Institute and 167 brains were received for examination. Of these 115 or 68·9 per cent proved positive and 49 or 29·3 per cent gave no evidence of rabies and three or 1·8 per cent were received in a state unfit for examination.

Pasteur Institute, Shillong.

85. In all 2,232 persons applied for treatment at Shillong and its centres and of them 1,875 completed the treatment. Among these completed cases 12 deaths took place from hydrophobia, giving a percentage mortality of 0·64. No case of paralysis following treatment was reported during the year.

Treatments were supplied for 38 dogs and five cows. A history card for dogs is now supplied with each treatment. An attempt is made to obtain some information regarding the results of treatment of these animals. Between 1933 to 1938, the number of dogs treated has steadily risen from 23 in 1933 to 299 in 1938. At the same time the cost of a course of complete treatment was reduced from Rs. 5 to Rs. 2-8-0. In the course of a few years, in view of the steady increase of the dog population treated, sufficient information will become available for evaluating the results of prophylactic treatment of dogs.

SECTION IX.

HEALTH OF JAILS IN INDIA.

General.

86. The statistical data presented in this section relate to British India.

The figures relating to the numerical strength of prisoners, accommodation available, admissions to hospitals, deaths, and expenditure are available for all the jails in India. In regard to the prevalence of specific diseases, however, only district and central jails provide the relevant statistical material in respect of all the provinces. It is therefore convenient to present the discussion in two paragraphs, *viz.*—

(*i*) all classes of jails,

(*ii*) district and central jails.

The figures relating to the Andamans form a separate paragraph in this section.

Jails of all Classes.

87. *Population, accommodation and overcrowding.*—Table IX (*i*) sets out information relating to accommodation and daily average population of prisoners in all classes of jails in each province, for the year 1938. Figures relating to 1937 are also given for the purpose of comparison.

TABLE IX (*i*).

Province.	Authorised accommodation, excluding hospitals and observation cells.		Daily average population.	
	1937.	1938.	1937.	1938.
N.-W. F. P.	5,263	5,263	6,227	5,757
Punjab	15,013	14,713	20,431	19,660
U. P.	32,150	32,523	29,782	28,768
Bihar	12,987	13,013	11,029	10,896
Orissa	2,257	2,257	1,733	1,666
Bengal	16,351	15,911	21,331	19,006
C. P.	6,538	6,515	4,942	4,522
Bombay*	14,983	15,805	8,865	8,518
Sind	5,142	5,205	4,663	4,675
Madras	18,575	18,720	14,718	13,140
Assam	3,772	3,772	3,566	3,304

The figures for authorised accommodation, excluding hospitals and observation cells, do not show any marked variation when compared with those of the previous year. A satisfactory feature of the daily average population figures for 1938 is that in all provinces, except Sind, a decrease was recorded. In spite of this, the authorised accommodation continued to be less than the average daily population in N.-W. F. P., the Punjab and Bengal.

*Including Dharwar Borstal School.

In the Punjab the figures for accommodation and daily average population were 7,136 and 8,791 for the four central jails while for the 18 district jails, including a camp jail, these figures were 6,164 and 8,833 respectively. In the 11 sub-jails the corresponding figures were 1,413 and 2,036. It is thus clear that, in all the different classes of jails, overcrowding continued to exist, although the fall in prison population in 1938 helped to relieve the congestion to some extent.

In the United Provinces, a decrease in the average daily population occurred due to premature releases, which were ordered by the Government towards the close of 1937. There was overcrowding in the mental wards and great difficulty was experienced in accommodating lunatics. The majority of jails in the United Provinces remained overcrowded, the reasons being labour strikes, Shia-Sunni disputes and communal riots. Heavy monsoon rains and floods in the United Provinces were responsible for damage done to most of the jail buildings, which were of a temporary nature. The main walls and the enclosure walls of several jails collapsed and the accommodation of the prisoners in these jails presented a serious problem.

Although no separate jail exists for female prisoners in Bihar, under the existing arrangements, all habitual female convicts are confined separately at Bhagalpur Central Prison.

Overcrowding was reported to be serious in the undertrial wards in Bengal and particularly in the central jails. The maximum accommodation available for undertrial prisoners was for 2,550 persons while the maximum number confined on a single day was 5,587.

In Bombay, from 1936 onwards, there has been a steady increase in the authorised accommodation and a decline in the average daily population. There is no indication of overcrowding in this province.

The total figures relating to Sind do not show any overcrowding. In the undertrial barracks, however, overcrowding did exist and it is expected that this congestion will be remedied on the completion of a new central prison.

The daily average population of Madras jails steadily declined during the past few years, the figures from 1935 to 1938 being 16,375, 15,967, 14,717 and 13,140 respectively. It is also satisfactory to note that the authorised accommodation was increased from 18,575 in 1937 to 18,720 in 1938. Premature releases of 1,503 convicts were ordered but the daily average figures failed to show a corresponding reduction because of the additions to the prison population due to the anti-Hindustani movement, enforcement of the Prohibition Act and recurrence of labour strikes.

In Assam the accommodation for the mentally defective presented serious difficulties. The accommodation provided in Tezpur Mental Hospital was inadequate and certified lunatics had to be detained in other jails for prolonged periods. In some jails it was impossible to confine the lunatics in separate cells and certified lunatics had therefore to be accommodated in barracks along with other convicts. The provision of increased accommodation in Tezpur Mental Hospital is reported to be an imperative necessity. The Assam Government had under consideration a scheme for the conversion of Nowgong district jail into a juvenile jail for the province. The scheme when put in operation will fulfil a much needed advance in jail arrangements. There was no overcrowding in the larger jails but the jails at Karimganj, Dhubri, Habiganj, North Lakhimpur and Gauhati were overcrowded for a considerable period during the year.

Constantly sick.—Table IX (*ii*) gives the daily average number of constantly sick and the sick rates per 1,000 among all classes of prisoners in the different provinces for 1937 and 1938. The constantly sick rates have been calculated per 1,000 of the daily average population.

TABLE IX (*ii*).

Province.	Average numbers of constantly sick.		Constantly sick rate per 1,000.	
	1937.	1938.	1937.	1938.
N.-W. F. P.	140	130	22	23
Punjab	435	334	21	17
U. P.	536	497	18	17
Bihar	255	209	23	19
Orissa	46	33	27	20
Bengal	761	676	36	36
C. P.	43	64	9	14
Bombay*	137	146	15	17
Sind	96	89	21	19
Madras	200	176	14	13
Assam	78	78	22	24

The majority of the provinces show a decrease in the constantly sick rate. The provinces for which the rate shows a rise are N.-W.F.P., C.P., Bombay and Assam. Bengal still continues to show the highest sick rate in India and during the past few years there appears to have been no indication of a decline in the rate. The Central Provinces which showed the lowest rate, *viz.*, 9 per 1,000 in 1936 and in 1937, recorded a rise to 14 *per mille*.. Madras had in 1938 the lowest rate among the provinces.

Admissions to hospitals and deaths.—In table IX (*iii*) are set out the annual hospital admissions and deaths for all classes of jails for 1937 and 1938. The admission and death figures have also been presented as rates per 1,000 of the average daily population.

TABLE IX (*iii*).

Province.	Admissions.				Deaths.			
	Number.		Rate per 1,000 of average strength.		Number.		Rate per 1,000 of average strength.	
	1937.	1938.	1937.	1938.	1937.	1938.	1937.	1938.
N.-W. F. P.	2,545	2,229	409	387	77	43	12	7
Punjab	9,371	8,439	459	429	177	113	9	6
U. P.	13,464	12,338	452	429	230	203	8	7
Bihar	4,219	3,932	383	361	143	108	13	10
Orissa	935	690	540	414	13	26	8	16
Bengal	19,198	17,657	900	929	234	194	11	10
C. P.	1,138	1,571	230	347	84	93	17	21
Bombay*	4,676	4,937	527	580	82	74	9	9
Sind	3,426	3,341	735	715	64	60	14	13
Madras	4,165	4,295	283	327	146	96	10	7
Assam	1,411	1,155	396	350	55	64	15	19

*Including Dharwar Borstal School.

Decrease in addmission rates has occurred in all provinces except in Bengal, C. P., Bombay and Madras. The death rates have shown a rise in the case of Orissa, C. P. and Assam. The C. P. death rate, which was the largest of all the provincial rates in 1937, rose from 17 *per mille* in that year to 21 *per mille* in 1938. The death rate in Orissa doubled itself from 8 in 1937 to 16 in 1938.. The causes of these wide variations lie, in many cases, in outbreaks of epidemics in selected jails in each province. The mortality from the chief diseases is discussed in a later paragraph. Decreases in the death rate occurred in N.-W. F. P., Punjab, U. P., Bihar, Bengal, Sind and Madras. The Punjab recorded the smallest death rate.

Weight of prisoners.—In table IX (*iv*) are set out the percentages of those prisoners (*a*) who gained in weight, (*b*) who showed no change and (*c*) who showed loss of weight at the time of release from jail. Figures for 1937 are also shown for purposes of comparison.

TABLE IX (*iv*).

Province.	Gained weight.		Stationary.		Lost weight.	
	1937.	1938.	1937.	1938.	1937.	1938.
N.-W. F. P.	59	49	32	43	9	8
Punjab	45	49	45	44	10	7
U. P.	60	56	30	34	10	10
Bihar	56	54	31	32	13	14
Orissa	62	62	27	28	11	10
Bengal	47	47	38	38	15	15
C. P.	68	63	24	28	8	9
Bombay	58	50	23	32	19	18
Sind	41	50	30	17	29	33
Madras	63	64	28	32	9	4
Assam	56	57	28	28	16	15

The following table IX (*v*) sets out the percentages of loss of weight for the last fifteen years in the different provinces. If these percentages are taken as negative indices of the trend of the health condition of prisoners this table is valuable for assessing the progress made in the health administration of provincial jails.

A comparison of these rates between the provinces might not be justified because the age compositions of the respective jail populations might vary considerably from province to province. It is perhaps more justifiable to compare the percentages for each province during this period of 15 years because there is little reason to assume that abnormal variations in age of the prisoners would have taken place during this short period of time. The decrease in the rate is well-marked in the case of N.-W. F. P. and to a less extent in the Punjab and Assam. In Bombay and Bihar and Orissa, there is no clear indication of a decline in the rate till 1936 when Sind became separated from Bombay and Orissa from Bihar, but the separate figures recorded for Sind and for Orissa from 1936 onwards seem to suggest that Bombay and Orissa might have had lower rates than the other two provinces. The other provinces show no evidence of any definite decrease in the rate, the figures for U. P. even suggesting that there might have been a slight worsening of the situation during recent years. Similar studies by provincial health authorities in respect of the jails within each province might be useful for focussing attention on backward jails.

Dietary, hospital, clothing and bedding and sanitation charges.—Table IX (*vi*) gives details of *per capita* expenditure in 1937 and 1938 on dietary, hospital, clothing and bedding and sanitation. The figures have been calculated on the average daily jail populations.

TABLE IX (*v*).

Percentage of prisoners who lost weight on release from jail.

Province.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.
N.-W. F. P.	29	26	24	19	15	14	14	16	12	12	7	8	11	9	8
Punjab	15	15	13	12	11	12	9	9	11	9	8	9	11	10	7
U. P.	8	7	8	8	8	8	9	12	12	11	10	10	11	10	10
Bihar	14	14	15	16	17	18	16	13	16	16	19	14	12	13	14
Orissa													9	11	10
Bengal	20	19	17	17	19	21	17	20	15	18	14	13	12	15	15
C. P.	11	10	11	9	10	13	9	11	12	12	12	9	11	8	9
Bombay	23	22	22	24	23	22	26	25	23	22	24	22	18	19	18
Sind													30	29	33
Madras	10	9	8	6	6	8	9	6	5	7	7	8	8	9	4
Assam.	21	21	19	15	15	15	14	14	14	13	12	14	13	16	15

TABLE IX (*vi*).

Province.	Dietary charges per head.		Hospital charges per head.		Clothing and bedding charges per head.		Sanitation charges per head.	
	1937.	1938.	1937.	1938.	1937.	1938.	1937.	1938.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
N.-W. F. P.	35 9 0	34 3 2	5 4 8	5 4 11	11 7 6	9 3 5	1 3 10	1 6 9
Punjab	35 1 11	29 3 5	4 7 9	3 4 2	7 11 9	7 15 10	2 5 9	2 12 8
U. P.	29 1 11	27 12 2	2 3 8	2 1 2	3 10 1	4 4 3	1 8 6	1 10 1
Bihar	36 9 5	38 5 0	5 5 10	6 2 0	5 13 0	6 14 0	2 11 3	2 8 0
Orissa	36 11 1	35 14 9	5 12 1	6 8 6	6 5 2	6 8 7	1 14 11	2 4 11
Bengal	39 8 0	41 13 0	7 9 0	8 14 0	3 10 0	5 0 0	3 4 0	4 3 0
C. P.	30 13 2	30 2 3	4 8 1	5 0 1	6 2 2	8 13 1	0 14 5	0 13 7
Bombay	43 1 5	39 0 0	1 10 8	1 9 5	3 8 5	4 4 1	7 9 2	7 1 2
Sind	39 0 3	39 10 4	2 13 4	2 4 3	5 6 5	9 9 11	3 1 7	4 3 5
Madras	40 1 5	44 5 10	3 6 2	3 3 3	5 4 11	4 7 10	3 8 4	3 12 10
Assam	33 15 3	34 15 5	4 1 6	4 7 6	4 10 3	6 4 6	0 11 9	1 0 1

On comparing the figures for 1937 and 1938 it will be seen that there are variations in respect of the *per capita* charges under the various heads. Provincial reports show that the fall in the charges was in many cases due to price changes while increases were due to improvements introduced by the authorities, such as the supply of separate towels to prisoners and of supplements to the usual diet, including meat, fish, milk and butter milk.

District and Central Jails

88. Figures for diseases for all provinces are available only in regard to the prisoners of district and central jails.. The attacks and deaths from the principal causes of sickness in the district and central jails of individual provinces are given in appendix VIII. The figures of daily average population corresponding to these figures are also shown. A consolidated statement is presented in table IX (*vii*) below.

TABLE IX (*vii*).

	1937.		1938.	
	Admissions	Rate *per mille.*	Admissions.	Rate *per mille.*
Malaria	14,205	122	12,383	113
Dysentery	3,533	30	3,999	37
Respiratory diseases*	3,764	32	3,229	30
Influenza	3,659	31	3,212	29
Diarrhœa	1,950	17	1,824	17
Pyrexia of uncertain origin (fever)	922	8	1,999	10
Pneumonia	1,127	10	933	9
Tubercle of the lungs	588	5	716	7
Enteric fever	236	2	301	3
Smallpox	33	0·3	25	0·2
Cholera	11	0·1	17	0·2

It will be seen that, with respect to a number of the diseases given in the above table, the admission rate has fallen in 1938 as compared with 1937. Malaria incidence among the jail population has shown a steady decrease during the past three years, the rates of admission during 1936, 1937 and 1938 being 150 *per mille*, 122 *per mille* and 113 *per mille*, respectively. The low incidence of epidemic diseases like smallpox and cholera indicates that the general standard of sanitation in the jails was high.

The chief causes of mortality are shown in Table IX (*viii*).

TABLE IX (*viii*).

	1937.		1938.	
	Deaths.	Rate. *per mille*	Deaths.	Rate. *per mille*
Pneumonia	236	2·0	195	1·8
Tubercle of the lungs	208	1·8	177	1·6
Dysentery	92	0·8	81	0·7
Respiratory diseases*	42	0·4	53	0·5
Anæmia and debility	32	0·3	33	0·3
Enteric fever	30	0·3	26	0·2
Malaria	44	0·4	24	0·2
Diarrhœa	21	0.2	17	0·2
Influenza	35	0·3	10	0·1
Cholera	3	0·03	3	0·03
Pyrexia of uncertain origin	4	0·03	2	0·02
Smallpox	2	0·02	1	0·01

* Excluding pneumonia and tubercle of the lungs.

While malaria claims the largest number of patients among the jail population its mortality rate is definitely lower than those of many of the diseases shown above. Pneumonia and tubercle of the lungs have contributed the largest rates of mortality.

Some brief comment may be made in respect of the more important diseases.

Cerebrospinal meningitis.—The disease was absent in the jails of all provinces except the Punjab and Bengal. In the Punjab its incidence was much less than that of the previous year, only 5 attacks being recorded in 1938 as compared with 41 during 1937. All the five cases proved fatal. The jails which were affected were the Borstal Institution at Lahore and the district jails at Multan and Ferozepur. Three cases were recorded in the Alipore Central Jail in Bengal but none proved fatal. One fatal case took place at the Krishnagar Jail.

Malaria.—In the Punjab the number of admissions due to this disease fell from 2,383 in 1937 to 1,607 in 1938. There was only one death as compared with 7 during 1937. An antimalarial campaign by the destruction of larvæ and administration of quinine was vigorously carried out and plasmochin and atebrin were used with success for treatment. In U. P. the number of admissions fell from 3,723 in 1937 to 3,396 in 1938. The number of deaths also decreased from 5 to 2. In Assam there was an appreciable decrease in admissions but the jails at Dhubri, Gauhati, Tezpur, Jorhat and Mangaldai recorded large figures for attacks from malaria, although only a single death took place among the prisoners in the province. Antimalarial measures were carried out in all jails in Madras and hospital admissions and deaths dropped from 213 and 4 in 1937 to 198 and 2 respectively in 1938. Its incidence was the highest in Bellary, followed by Coimbatore and Rajahmundry. The two deaths recorded during 1938 occurred in the Central Jail, Rajahmundry. In C. P. the number of admissions increased from 230 in 1937 to 335 in 1938. In Sind there were 1,015 admissions and 1 death as against 1,110 admissions with no death in 1937. Abnormally large admissions were recorded in Sukkur district prison and this was attributed to an increased prevalence of mosquitoes in the surrounding area. Spraying of the barracks and cells with pyrocide 20 was continued at Hyderabad Central Prison, Sind. Orissa recorded a higher incidence than that during 1937, the figures for attacks being 56 in 1938 as against 33 in 1937. Bombay recorded 930 cases with 2 deaths in 1938 as against 841 cases and 3 deaths in 1937. This increase was largely contributed by Yeravda Central Prison and Bijapur Prison where epidemics of malaria took place after heavy rains late in the monsoon season. Bihar recorded a decrease in incidence from 500 cases and 3 deaths in 1937 to 436 cases and 3 deaths in 1938. In Bengal, the incidence of malaria dropped from 3,835 admissions and 17 deaths in 1937 to 3,418 admissions and 10 deaths in 1938.

Influenza.—As a cause of mortality influenza was of little importance, the total number of deaths due to this cause in all the jails of British India, excluding the Andamans, being 10 in 1938. Admissions due to influenza totalled 3,212. Sind reported no case of influenza while, among the other provinces, the rate of admission was the highest in Bengal (106) and the lowest in the Punjab (9).

Cholera.—The general absence of cholera in the jails of British India, in spite of a wide prevalence of the disease among the surrounding civil population in many provinces, is a welcome indication of the effectiveness of the precautionary measures undertaken by the authorities to safeguard the health of the prisoners. The total number of admissions from cholera was 17 in 1938

of which 15 were in U. P. and the other two in the Punjab and Sind. In U. P., the civil population experienced a widespread epidemic following the Hardwar *Kumbh Mela* but it is satisfactory to record that only two jails reported cases, the Naini Central Prison and the Gorakhpur District Jail.

Plague.—This disease was absent from all the jails in the provinces.

Dysentery.—The Punjab has recorded a steady decrease in hospital admissions and deaths from this disease during the last quinquennium. In 1934 there were 583 attacks and 11 deaths while the corresponding figures for 1938 were only 67 and .1 respectively. In U. P. there were 512 admissions and 7 deaths in 1938 as compared with 447 admissions and 4 deaths in 1937. In Assam cases of dysentery occurred in all jails except those in Shillong, Kohima, Aijal and South Sylhet. The total numbers of admissions and deaths showed decreases during 1938, the figures being 315 and 13 respectively as compared with 351 and 14 in 1937. In Madras Presidency the incidence of the disease showed no great variation as compared with the previous year, the figures for admissions and deaths being 289 and 6 in 1938 as against 264 and 7 during the previous year. In C. P. this disease showed a considerable increase, the admissions to hospital being 428 in 1938 as compared with 102 during 1937. The jails at Nagpur and Amraoti showed the largest numbers of admissions. In Orissa there was a slight fall in the incidence of the disease, the number of admissions in 1938 being 55 as against 69 in 1937. In Bombay presidency the total admissions due to dysentery decreased from 254 in 1937 to 177 in 1938, the Yeravda Central Prison, Rana District Jail and Ahmedabad Central Prison contributing the largest share to this decrease. In Bihar admissions due to this disease totalled 480 as against 435 in 1937, the Central Jail at Buxar and the District Jails at Motihari and Darbhanga having recorded the highest figures for admissions. In Bengal the incidence of dysentery showed an increase from 1,176 in 1937 to 1,498 in 1938.

Diarrhœa.—Except in U. P. and Bengal the figures for admissions and deaths from diarrhœa in the different provinces showed no great variations from those of the previous year. In U. P. admissions rose from 354 in 1937 to 420 in 1938 while in Bengal there was a corresponding fall from 858 to 644.

Pneumonia.—Admissions due to pneumonia in British India totalled 933, as compared with 1,127, in 1937. This represents a fall of 17 per cent. A comparison of the figures for the provinces shows that in all except Sind, the Central Provinces and Orissa, the incidence in 1938 was less than in 1937, noticeable decreases being recorded in Bengal (42·5 per cent), N.-W. F. P. (37·6 per cent) and Madras (33·3 per cent).

Tubercle of the lungs.— Admissions for tubercle of the lungs in British India, excluding the Andamans, rose from 588 in 1937 to 716 in the present year, marked increases being recorded in the Punjab (74·0 per cent) and Bengal (32·0 per cent).

In a number of provinces special provision exists for the accommodation of tuberculosis patients, a summary of which was given in last year's report. Comparative figures for individual provinces during 1937 and 1938 and for the quinquennium are given in the appendix to this section.

Special Remarks on Provinces.

89. The provincial jail administration reports make special mention of measures taken to improve the physical and mental well-being of the prisoners. In nearly every province improvements to the diet and clothing, the expansion of existing facilities for the education of adult and adolescent prisoners, the provision of libraries, of newspapers and periodicals and of radio sets were

among the measures adopted to improve the conditions of jail life. In some provinces, physical exercise and games, health lectures and instruction in first aid also played a part in the campaign to improve the health of the prisoners. Religious and moral instruction also received adequate attention.

N.-W. F. Province.—In this province the numbers of central, district and sub-jails during 1938 were three, three and two respectively. The year under review was, on the whole, a healthy year. The death rate from all causes *per mille* of the total strength of prisoners fell from 12·4 in 1937 to 7·5 in 1938. A striking decrease in the incidence of malaria has been recorded since 1936, the figures for that year, 1937 and 1938 being 926, 688 and 504 respectively. Pneumonia has also shown a steady decrease in incidence during the quinquennium, 1934-38, from 187 in 1934 to 45 in 1938. The funds allotted for the repairs and maintenance of buildings were inadequate but the Public Works Department has agreed to place at the disposal of the Jail Department funds at least equal to 3/8 per cent of the capital cost of jail buildings. Among the works executed during the year mention may be made of the electrification of the District Jail at Abbottabad, provision of concrete cement drain and floor in certain buildings attached to Dera Ismail Khan and the construction of a cook-house at Bannu Jail.

Punjab.—The numbers of central, district, sub-jails and camp jails during 1938 were four, 17, 11 and one respectively. There also existed a Borstal Institution and a special jail for female prisoners. A large number of important works was carried out at a total cost of Rs. three lakhs during the year. These included the construction of new cells, barracks, work and factory sheds, kitchens, new infectious wards, wells and quarters for warders and the electrification of a number of places.

The year 1938 recorded a further improvement in health and this may be attributed to the precautionary measures taken by the medical staff, such as fly destruction, fly proofing of all jail latrines, prevention of mosquito breeding and destruction of larvae, trapping of mosquitoes, prophylactic administration of quinine, smallpox vaccination of all prisoners, purification of wells, inoculation against cholera at the time of the *Kumbh Mela*, gargling parades, mass treatment for hookworm infection and lectures on health matters.

The Borstal Institution at Lahore continued to function as a combined jail for those convicted under the Borstal Act and a Star Jail for adolescent offenders. The year 1938 was healthy for this institution also.

United Provinces.—The numbers of central, district and juvenile jails at the beginning of 1938 were six, 49 and one respectively. Special features of the year under report included legislative and executive action taken by the Provincial Government to improve the administration of jails. Three Acts were passed, namely, (1) The United Provinces First Offender's Probation Act, (2) the United Provinces Borstal Act and (3) Prisoners' Release on Probation Act. Special Committees were appointed by the Government to prepare a programme of reforms in jails together with their financial implications. The United Provinces Discharged Prisoners Aid Society was formed and branches were opened for every district. The Inspector General of Prisons undertook a tour of the provinces of Bihar, Bengal, Orissa, Madras, Bombay, Central Provinces and Delhi in order to acquaint himself with the jail administration of these areas.

From the point of view of health, it is gratifying to note that, in spite of widespread epidemics among the general population, the health of the jails remained quite satisfactory and that the year under review recorded the lowest mortality rate for the past ten years. Additional water supply was provided in seven district jails and one central prison by the construction of new wells.

Bihar.—The numbers of central, district and juvenile jails in the province were four, nine and one respectively. A new subsidiary jail was opened at Madhipura thus bringing the total of such jails to 41. Criminal lunatics are confined in the Indian Mental Hospital at Ranchi but, owing to insufficient accommodation, some were transferred to Hazaribagh jail.

The daily average of juvenile prisoners was 219. The industries taught to them were carpentry, tin, masonry, cane work, gardening, and soapmaking. The year under review showed the lowest death rate ever recorded. A fall in mortality was noticed in all the central jails. Darbhanga jail showed the highest mortality, the death rate being 25 *per mille.*

Orissa.—The numbers of the district and sub-jails during 1938 were four and 26 respectively. There was no central jail in the province and the Cuttack District Jail was therefore used to confine life convicts and long term prisoners. There is at present no juvenile jail for the province but all such prisoners were accommodated in the jail at Angul. Criminal and non-criminal lunatics were confined in the Mental Hospital at Kanke. Among the sanitary works carried out during the year the important ones were the provision of *pucca* floor and sleeping berths in the Sambalpur jail and improved sanitary arrangements at the Cuttack jail. The general health of the prisoners was reported to be better during the year under review than in 1937.

Bengal.—The numbers of central, district and subsidiary jails in the province were six, 19 and 62 respectively. There were also a Borstal School and a special jail. A new central jail was constructed at Dum Dum.

The Bengal After-Care Association and Prisoners Aid Society continued to render good service to released adolescent prisoners of the Borstal School and juvenile prisoners of the Reformatory School. An industrial section was opened for the manufacture of cycle tyres, canvas, durries and carpets thus providing employment for Borstal boys who were released on license.

Central Provinces.—The numbers of central, district and subsidiary jails during 1938 were two, ten and nine respectively. Additional accommodation was provided in the Mental Hospital at Nagpur and it is not necessary now to confine criminal lunatics in other jails. The construction of a new jail subsidiary to the Narsinghpur Borstal Institution was nearing completion and it was expected that from 1939 all adult prisoners, who had to be kept in the Borstal Institution, would be transferred to this jail. Training was imparted in weaving, carpentry, pottery, button making, glass and board painting, agriculture and engine driving. Soapmaking was introduced during 1938.

The year 1938 was on the whole not a healthy year. There were outbreaks of dysentery in the Nagpur Central Jail. The highest death rate, 128 *per mille* in 1938 as against 58 in 1937, was recorded in the Betul jail which accommodates all aged and infirm prisoners. Akola jail had a death rate of 59 *per mille.*

Bombay.—There were four central prisons, six district prisons, 184 sub-jails and 283 lockups during 1938. A temporary prison at Worli was opened when communal riots broke out in Bombay in April 1938. A separate section for juvenile female offenders was opened in Yeravda Female Jail.

Considerable improvement was effected in regard to bathing and ventilation arrangements in the sub-jails and lockups. Various other improvements were introduced including the issue of instructions to prison medical officers to obtain a second medical opinion in cases of serious illness amongst the prisoners, the appointment of non-official members to the Committees of Visitors to central and district prisons, the supply of sheets to prisoners and the provision of electrically driven pumps for the wells of the Borstal Institution at Dharwar.

Sind.—In 1938 there were in Sind one central jail, two district jails, 58 sub-jails and one convict gang. This year was on the whole more healthy than the previous year. The prison with the highest death rate of 18·9 *per mille* was the Sukkur district prison. This high death rate was ascribed to the greater mortality from pneumonia on account of extremes of temperature in January and December. The formation of "spleen gangs" for the special observation and treatment of prisoners suffering from chronic malaria was continued. The dietary was revised and considerably enlarged. Samples of milk and *til* oil were subjected periodically to chemical analysis.

Madras.—The numbers of central, district and special jails and of Borstal institutions were the same as those at the end of 1937, *viz.*, nine, two, three and two respectively. Two new sub-jails were opened during 1938, thus making a total of 293 sub-jails in the province. The Government have drawn up a scheme for sending convicts belonging to criminal tribes to suitable settlements, where they have to work under the settlement manager for a period not less than the unexpired portion of their sentence. They are permitted to take their families to the settlement.

The District Jail, Cuddalore, continued to accommodate the mental defectives, recovered criminal lunatics and epileptics for special treatment. A proposal to convert this jail into a combined institution for youthful offenders and criminal lunatics was under the consideration of the Government.

Assam.—The number of jails showed no change from the previous year. All the jails are structurally defective inasmuch as they do not provide for the segregation of habituals from casuals. The standard of discipline maintained during the year was satisfactory.

Andamans.

90. The statistical data relating to the jail population of the Andamans have been discussed in two separate parts (1) those relating to the cellular jail and associated barracks and (2) those relating to *talabdars* and self-supporting convicts outside the cellular jail and associated barracks.

Cellular jail and associated barracks.—The average daily strength of prisoners in the cellular jail and associated barracks was 325. The maximum population on any one day was 478 while there was accommodation available for 802 persons. No overcrowding therefore existed in the jail or associated barracks during the year. The daily average number of sick persons was 9·4. This gives a rate of 29 per thousand of the daily average strength for 1938 as compared with 42 per thousand for 1937. Altogether 246 persons were admitted to hospital giving an admission rate of 760 per thousand of the average daily strength as compared with the rate of 1,205 per thousand in 1937. Deaths numbered four giving a rate of 12·3 per thousand as compared with a rate of 3·1 *per mille* in the previous year. Malaria as usual was responsible for the largest amount of sickness. Next in order came dysentery, respiratory diseases, and diarrhœa.

Talabdars and self-supporting convicts outside the cellular jail and associated barracks.—The daily average population numbered 5,683 males and 6 females as against 5,670 males and 10 females in the previous year. Among this class of prisoners a certain number is employed as servants under the staff and they are accommodated in the houses of their employers. Excluding these men, the maximum number requiring accommodation on any one day of the year was 3,563 while the daily average number was 3,183. The accommodation available for them in the barracks and cells allowing 50 superficial feet per person, was for a total of 3,667. It is therefore clear that no overcrowding existed during the year.

The average daily sick numbered 174·5 as against 140·0 in 1937, an increase of nearly 25 per cent. This was due to an increase in the incidence of Weil's disease, which necessitated prolonged detention of the prisoners in hospital. The numbers of daily sick persons per thousand of the average strength for 1936, 1937 and 1938 were 21, 26 and 31 respectively. Weil's disease was also responsible for an increase in the total mortality among this class of prisoners, the figure having risen from 58 in 1937 to 76 in 1938. Due to this cause alone there were 25 deaths as against 14 in 1937.

The following table sets out the admission and case mortality rates due to malaria for the last six years. The figures given include those relating to convicts confined in the cellular jail and associated barracks.

Year.	Total admissions for malaria.	Admission rate *per mille* of average strength.	Total deaths.	Mortality rate (per cent of cases).
1933 . .	1,621	245	16	0·99
1934 . .	1,497	260	9	0·64
1935 . .	1,353	253	7	0·52
1936 . .	723	110	3	0·41
1937 . .	1,438	253	5	0·32
1938 . .	1,164	205	3	0·25

While a consistent fall is evident in respect of the mortality rate, the admission rate has not, on the other hand, shown a corresponding or continuous reduction. However, the year under review has shown a welcome drop in the rate of incidence from 253 to 205 per thousand. The spleens of all new entrants in Port Blair were examined and the cases were given treatment before being sent to different settlements.

As stated previously there was an increased prevalence of Weil's disease in 1938. Hospital admissions and deaths both showed increases. The increase during the year under review was reported to have been caused by severe floods that occurred in December 1937 resulting in the destruction of a large number of rats. Although an attempt was made to have as many dead rats as possible collected and burnt, this measure could not be carried out effectively all over the settlement.

Dysentery was responsible for 133 admissions and four deaths during 1938 as compared with 122 admissions and four deaths in 1937. There was one sporadic case of enteric fever as compared with nine in 1937. A total of 126 cases of influenza of a mild type was reported during the year. These cases occurred mostly among new arrivals or among their contacts. Anæmia caused nine deaths and was responsible for 45 cases. These cases were secondary either to malaria, ankylostomiasis, or dysentery.

Major and minor operations performed during the year numbered 559 and 219 radiograms were taken. A total of 213 vaccinations against smallpox was performed of which 176 were successful, 10 were failures and for 27 vaccinations the results were not known.

The bacteriological laboratory carried out a large amount of useful work, including examination of blood slides, sputum, urine and fœces, Wassermann, Kahn's, Fontana's and Widal tests, cultural and other examinations for Weil's disease and examination of milk samples

Conclusion.

91. During the year under review the health of the jail population in British India was satisfactory and showed an improvement in comparison with the previous year. Excluding the Andamans, the death rate from all causes decreased from 10 *per mille* in 1937 to nine *per mille* in 1938 ; the constantly sick rate and hospital admission rate also showed reductions from 22 and 493 per 1,000 of the average strength to 21 and 479 respectively in 1938. As regards special diseases, influenza, malaria, pneumonia, other respiratory diseases and diarrhoea showed appreciable decreases in incidence. During the past few years the increasing control of malaria has been a conspicuous feature of provincial jail health administration and the year under review has shown a further reduction in the incidence of this disease in almost every province.

As regards the Andamans, the convict population has been divided into two groups, (1) those confined in cellular jails and associated barracks and (2) *talabdars* and self-supporting convicts. The following tabular statement gives the death rates from all causes, the constantly sick rates and the hospital admission rates for these two classes of prisoners during 1937 and 1938 :—

	Death rate.		Constantly sick rate.		Hospital admission rate.	
	1937.	1938.	1937.	1938.	1937.	1938.
Cellular jails .	3	12	42	29	1,205	760
Talabdars and self-supporting prisoners .	10	13	26	31	634	598

The death rates show relatively large increases in respect of both classes of prisoners. But these increases in the rates are of little significance because they represent only total increases of two and 18 deaths in the two types of prisoners. On the other hand, in the cellular jails both the constantly sick and hospital admission rates show definite decreases in 1938 as compared with the previous year while, in respect of *talabdars* and self-supporting prisoners, the hospital admission rate has shown a decrease. An increased prevalence of Weil's disease among this class of prisoners was responsible for the higher death rate and for the rise in the constantly sick rate. On the whole the figures shown above give no indication of any deterioration in the health of the prisoners in the Andamans.

SECTION X.

VOLUNTARY ORGANISATIONS.

Introduction.

92. Voluntary effort plays such an important part in the field of public health endeavour that a review of the health conditions in India cannot be complete without a brief survey of the activities of some of the more important of these organisations. Some of these institutions are of an all-India character, with branches in the provinces and Indian States, while others confine their activities to the provincial sphere or to the local areas in which they are situated. To the former class belong the Indian Red Cross Society, the Indian Council of the British Empire Leprosy Relief Association and the Mission to Lepers. In the provinces various organisations exist, some of which are mainly engaged in health propaganda while others combine health education with the provision for the people of the areas in which they work, of specific services such as those for maternity and child welfare.

Indian Red Cross Society.*

93. The Society continued its general peacetime activities and, in addition, provided assistance for the relief of sufferers from floods in Bengal and Assam, and from famine in the Hissar district of the Punjab. In the international sphere, in response to an appeal of the International Red Cross for the continuation of Red Cross relief operations in Spain, the Indian Red Cross Society made a monthly contribution of Rs. 250 during the last six months of the year under review and two provincial branches also made monthly contributions through the Society, making a total of Rs. 2,285 during the year.

In response to further appeals from the International Red Cross for relief work in China, the Society contributed Rs. 5,000 ; contributions by branches for the same cause amounted to Rs. 3,662. Again, on the receipt of further news of serious distress in China, the Society voted a sum of Rs. 1,500 and arranged to send a supply of drugs. The Society also issued an appeal, through the press, for funds and gifts of drugs and provisions for China.

One of the primary duties of the Society is to provide for medical and other aid for the sick and wounded in the event of war and the international crisis of September 1938 found the Society ready with a comprehensive plan embracing the activities of the Indian Red Cross Society, the St. John Ambulance Association and St. John Ambulance Brigade Overseas as an auxiliary to the army medical and nursing services in time of war. This important plan has been drawn up in consultation with provincial organisations and ensures the fullest possible coordination between headquarters and branches, when put into action. The Red Cross roll of trained nurses for war and disaster, which forms part of the mobilisation plan, had 68 nurses on the list.

Dr. Alice Pennell and Dr. Jean M. Orkney represented the Society as fraternal delegates to the sixth Biennial Conference of the National Council of Women in India held in Delhi.

To the XVIth International Red Cross Conference held in London, the Society sent a delegation under the leadership of Major-General E. W. C. Bradfield, who submitted a report on the growth of the Indian Society in all fields, with a map illustrating its activities. The work of the Conference was distributed among four Commissions *viz.* the Legal Commission, the Relief

*Prepared from a note supplied by the Organising Secretary, Indian Red Cross Society.

Commission, the Educational Commission and the General Commission. The Indian delegation was represented on all the Commissions and made its contribution to the deliberations.

Both headquarters and branches continued to take a very active interest in the appeal made by Her Excellency the Marchioness of Linlithgow for the King Emperor's Anti-Tuberculosis Fund.

The branches of the Red Cross in India at the end of 1938 consisted of 26 provincial and State branches and of 265 district branches as compared with 25 and 241 respectively during 1937.

King George Thanksgiving (Anti-Tuberculosis) Fund.

The outstanding feature of the year was the successful appeal of Her Excellency the Marchioness of Linlithgow for the King Emperor's Anti-Tuberculosis Fund. Her Excellency in issuing the appeal stated that, if it was successful, the intention was to found a Tuberculosis Association for India, consisting of a central body supported by affiliated provincial and State organisations. The establishment of a comprehensive organisation with the help of the new fund marks an important step towards a more effective control of tuberculosis in India.

His Excellency the Viceroy was approached to sanction the separation of the King George Thanksgiving (Anti-Tuberculosis) Fund from the Indian Red Cross Society and to allow the transfer of the capital and balances of the Fund to the new Tuberculosis Association. His Excellency was pleased to sanction the reorganisation. Although the new arrangement has resulted in a formal separation of the two bodies the two will continue to work in close cooperation in the fields of education and prevention.

Fortyfive doctors received training at two post-graduate courses.

There was an extension of the Fund's educational activities in co-operation with various voluntary and social organisations. At the suggestion of the Fund the Indian Medical Gazette published a special Tuberculosis Number.

In the field of international relationships a new contact was established with the " Imperial Bureau " of the Empire Conference on the Care and After Care of the Tuberculous, and several provincial representatives took advantage of the facilities for study tours offered by the Bureau. With the help of the International Union against Tuberculosis a nominee of the Fund secured a scholarship at the Carlo Forlanini Institute, Rome.

Maternity and Child Welfare Bureau.

The Committee of the Maternity and Child Welfare Bureau administered the funds of the Lady Chelmsford League, the Victoria Memorial Scholarships Fund and the Army Child Welfare Fund.

The funds of the Lady Chelmsford League were distributed mainly as grants-in-aid to health schools and welfare centres. The schools for health visitors in Delhi, Calcutta, Madras, Rangoon and the new school in Poona received grants as well as the Nursery School and Kindergarten, Mysore and the School of Mothercraft, Bareilly. A scholarship was provided for a woman medical graduate for the course of the Diploma in Maternity and Child Welfare at the All-India Institute of Hygiene and Public Health, Calcutta. A few additional grants were given direct from the funds of the Bureau to certain maternity and child welfare schemes, one of which was a grant towards the work of the Najafgarh Rural Unit.

The Victoria Memorial Scholarships Fund was distributed almost wholly as grants-in-aid for the training of *dais*. Grants were given to seven training schools. Other aided schemes give institutional and domiciliary training, or domiciliary training alone, the training being carried on in connection with welfare centres.

The Army Child Welfare Fund was distributed to 54 Indian and 26 British Army centres during the year under review. Army child welfare work owes much to the help and enthusiasm of voluntary workers and the progress in this field has been marked.

Junior Red Cross.

The activities of the Junior Red Cross for the promotion of health increased in all directions, specially in anti-epidemic and village improvement work. An essay competition on "Junior's mission in promoting the health of the community with special reference to tuberculosis" was organised for Junior Red Cross groups. Branches also organised a number of Junior Red Cross competitions and rallies. Considerable interest was shown in the Junior Red Cross movement in the provinces, particularly in the Punjab, Bombay, the Central Provinces and Madras. A successful conference of Bengal Junior Red Cross Counsellors was held in Calcutta. A number of Junior Red Cross publications was prepared in Hindi and Urdu. One hundred and seventyone albums were received and 94 were sent out during 1938; the quality of exchange albums showed considerable improvement and they were appreciatively commented upon by the League of Red Cross Societies, Paris.

The campaign for the prevention of blindness was continued and courses of lectures in teachers' training institutions were given in Assam, Bangalore, Baroda, Bengal, Bombay, the Central Provinces, Delhi, Hyderabad, Kotah, Orissa, Rajputana, Sind, Travancore and the United Provinces. Pamphlets on the subject in Indian languages, lantern slides, posters and literature were distributed and material for a radio talk was supplied for a broadcast from the Delhi station.

Propaganda and Publicity.—The activities under these heads were of a varied nature. A steady increase has taken place in the demand for cinema films, particularly from schools, an indication of the growing popularity of this method of health propaganda. In addition, the Red Cross Depot distributed a large amount of health propaganda material etc. to provincial, State and district branches, and also to Government departments of health, private bodies, health centres, educational institutions, officials and others. The sale of magic lantern equipment increased by 50 per cent.

At the request of the High Commissioner for India a comprehensive series of exhibits was supplied to the Women's Pavilion at the Glasgow Empire Exhibition; these included posters, pamphlets and cut-out models showing the part played in the relief of disaster and in work among women and children. Several requests from various health organisations, both in the United States and England, for posters and literature of the Society were received directly or through the Public Health Commissioner with the Government of India and such material was supplied free of charge.

Radio dialogues on health subjects were supplied to the Bombay, Calcutta, Delhi, Madras, Lahore, Lucknow, Peshawar and Mysore Stations in addition to special talks on maternity and child welfare topics asked for by the Delhi Station.

The staff of the Society produced 3,274 lantern slides and publicity photographs for all sections of the Society and prepared a number of certificates and warrants of constitution for the St. John Ambulance Association.

The periodicals published included "Journal of the Indian Red Cross Society" and "The Indian Junior" from the Headquarters, "The Red Cross" by the Punjab Branch, "The Madras Junior" by the Madras Branch and "The Sind Junior" by the Sind Branch of the Indian Red Cross Society.

Miscellaneous Activities.—The headquarters scheme of first aid posts on highways was introduced by the Punjab branch which established 46 posts, with the international type of signboard, on the Grand Trunk Road. They are located in schools, dispensaries, hospitals and police stations on the roadside.

Several provincial branches, acting on the suggestion of the Headquarters, devoted funds to the improvement of sick nursing. Reports from all branches indicate close cooperation with the St. John Ambulance Association.

British Empire Leprosy Relief Association (Indian Council).*

94. The year 1938 was a year of steady progress in antileprosy work in India. The work of the provincial branches has developed and extended, partly as the result of the adoption of the new constitution recommended two years ago and partly as the result of increased interest taken by provincial Governments in the campaign against the disease. In various parts of India schemes for the development of antileprosy work are under consideration or are being adopted.

Another encouraging sign is the increased interest in leprosy taken by the medical profession as a whole, for which the special courses of training provided by the Association during recent years have undoubtedly been largely responsible. During the year under review special courses were held in Calcutta, Bombay, Chingleput and Dichpali. The total attendance at these courses was 99 including 13 final year M. B. B. S. students of Osmania University who took their training at Dichpali. The greater interest taken by the medical profession in leprosy is also shown by the excellent reception given to two books on leprosy published by the Association during the year. The first is the enlarged and completely revised sixth edition of Dr. Muir's book entitled "Leprosy, its Diagnosis, Treatment and Prevention". The second, "Lecture Notes on Leprosy" by Dr. Lowe, is a smaller and less expensive publication and it has been designed primarily for general practitioners and medical students.

Mention may also be made of the increasing emphasis laid on the segregation of infectious cases in the preventive campaign against leprosy. During the year, several new institutions and colonies for this purpose have been established in India; the necessity for the isolation of lepers outside villages and towns is also becoming more fully recognised.

An important event during the year was the International Leprosy Congress at Cairo in March. India was represented at the Congress by a strong delegation headed by Colonel Sir Alexander Russell. The delegation from India took an active part in the proceedings and the Conference was of great benefit to the workers from India by enabling them to establish

*Prepared from a note supplied by the Honorary Secretary, British Empire Leprosy Relief Association (Indian Council) New Delhi.

contacts with workers abroad and mutually to exchange experience in antileprosy work. The reports of the discussions at the Conference indicate that antileprosy work in India has been proceeding on acknowledged sound lines.

Research work was carried on, as in previous years, at the Calcutta School of Tropical Medicine in cooperation with the School and the Indian Research Fund Association under the direction of Dr. Lowe, who was assisted by a staff of clinical, bacteriological and chemical workers. Most of them are paid for by the British Empire Leprosy Relief Association. A summary of the researches carried out is given at pages 61 and 62.

Dr. Santra, the Propaganda Officer, toured in the provinces of Orissa, Bombay and Bihar, and in the Indian States of Cochin, Travancore, Kanker, Tripura and Cooch Behar. He carried out surveys and propaganda work, besides offering advice to the authorities for the development of their antileprosy campaigns.

The provincial and State branches of the Association reported considerable activity during the year, including the opening of new treatment centres, the carrying out of leprosy surveys and propaganda among the people. For detailed accounts of these activities the Association's annual report for 1938 should be consulted. However, special attention may be drawn to the Orissa provincial branch, which was started in 1937 and which is reported to have made good progress during the year under review. The provincial Government have sanctioned a scheme of antileprosy work which provides a District Leprosy Officer and three compounders for each district and a Leprosy Officer for the province as a whole. Survey work has been undertaken by these officers on an organised basis, while other activities included a course of training in leprosy at Cuttack and intensive propaganda among the people. Mention should also be made of the Madras branch, which was reorganised with its headquarters at the Lady Willingdon Leper Settlement and with the Superintendent of the Settlement as the Honorary Treasurer of the provincial branch. It was decided that routine treatment should be made the concern of district authorities and that the provincial headquarters should concentrate on investigations into leprosy of childhood, rural and urban control of leprosy, experiments in the segregation of leper children and the training of workers for propaganda.

The total income of the Indian Council for 1938 was Rs. 1,27,485 and the expenditure was Rs. 1,38,362 including Rs. 69,975 distributed as grants to provincial and State branches.

Mission to Lepers.

95. The latest annual report of the Mission to Lepers, which has now completed 65 years in India, has again recorded a period of expanding activity and of increased usefulness. The expenditure in India and Burma of the Mission's work was Rs. 8,42,535 in 1938 compared with Rs. 8,12,209 in 1937. Of this total expenditure nearly 48·7 per cent came from voluntary subscriptions and the extent to which the cause of the Indian leper has found support in other lands may be judged from the fact that well over three and a half lakhs of rupees came from subscriptions abroad. In the 34 homes maintained by the Mission 7,565 resident lepers were cared for and, in addition, 834 healthy children of lepers were brought up separately. The Mission was also able to make grants-in-aid of a substantial character to other homes with 2,270 leper inmates and 151 healthy children. The superintendence of the

homes is, in almost every case, a voluntary service and the Mission was therefore able to devote practically the whole of the income to the direct care of the lepers and the maintenance of the local staffs.

Five hundred and fourteen patients were discharged during 1938 with the disease arrested before deformity began. The patients are kept under observation for a period of six months after the last traces of activity have disappeared. However, the Mission's report rightly points out that the proper term to use is " arrested " and not " cured " because the number of known relapses in 1938 from among those discharged in previous years was 79. Apart from medical aid it is pointed out that the chief service " which the Mission brings to the adult patient is, perhaps, by the fellowship and activities and regular conditions of living provided, which help to re-establish him in a life of happiness and usefulness, even within the bonds of his disease. For the children with only early marks of leprosy the Mission has evidence that it can do much more, enabling them to grow up into men and women who, with reasonable safeguards, should remain in good health ". To the community as a whole the facilities for the segregation of thousands of infectious patients which the Mission's homes have provided during these many years have constituted a service of inestimable benefit.

International Health Division of the Rockefeller Foundation.*

96. The activities reported in 1937 were in operation in 1938. New work was undertaken in respect of the Singur Health Unit, Bengal Presidency, while research work on the flow of ground waters commenced in the Punjab under the direction of a Staff Engineer of the Foundation.

Madras Presidency.—Malaria research work at the King Institute Guindy, at Ennore and at Pattukottai in the Tanjore district made further advances. Additional engineering research at Pattukottai was undertaken by the Staff Malaria Engineer. Supervisory engineering assistance was arranged for in respect of the Madras Government's malaria control project in the town of Pattukottai.

Cooperation with the Public Health Department in the Poonamallee Health Unit continued. The chief development in this Unit has been the increased popularity of the maternity and child welfare work making necessary the employment of additional midwives. The Unit leads in India in respect of the provision of good water supplies by means of bored wells. The general sanitation work as represented by health leagues remains to be developed.

Mysore State.—In the Closepet Health Unit cooperative work made steady progress throughout the year. In addition to the routine health unit work the Government class for sanitary inspectors received two weeks' field training in the Unit. This is one of the important functions of health unit work. In ten villages, health leagues were formed.

Travancore State.—Although the financial assistance given by the Foundation ceased, it is gratifying to note that the health unit activities continued, in spite of considerable local difficulties not associated with public health work.

United Provinces.—The financial cooperative arrangement between the provincial Government and the Rockefeller Foundation, in respect of the

*A note prepared by Dr. W. P. Jacocks, a representative of the Rock-feller Foundation in India.

health unit work at Partabgarh ended in July. The Government contemplated stopping the work after the cooperative period ended, even though this was not in accord with the original understanding. It is encouraging to report, however, that the people made such strong representations that the Government felt compelled to continue the Unit. It is worth while mentioning also that, in order to keep the Unit going, four local bodies provided from their meagre funds a large part of the money which had been formerly supplied by the International Health Division. It is desirable to record again that, in the development of active health leagues, the Partabgarh Unit still remains the leader in India.

Delhi Province.—As is usual in the beginning, the Najafgarh Health Unit met many obstacles in its second year of operation in establishing working methods and in developing a satisfactory staff. By the end of the year, however, most of the difficulties had been overcome and the work of the Unit seemed destined to develop in a satisfactory way.

Bengal Presidency.—Cooperation with the Bengal Presidency in respect of the Singur Health Unit began this year. Due to local circumstances no actual work was attempted, but a suitable medical officer of health was selected and trained in Ceylon and a part of the subordinate staff was assembled. A philanthropic minded person donated a large sum of money to finance the building of a central office and adequate quarters for the maternity and child welfare staff. This is unique in health unit history in India and is worthy of emulation. It is hoped that suitable arrangements can be made at Singur for giving field training in rural health subjects to the students of the All-India Institute of Hygiene and Public Health.

Assistance in health unit work, on a sliding scale over a period of five years, is a part of the accepted policy of the International Health Division in India. This work has proved useful for demonstrating methods of procedure and for training local personnel. Provinces are not receiving the greatest return from their investments due to their inability to employ and keep suitably trained medical officers of health, lady doctors, health visitors and midwives. Interest in rural health work is increasing and the demand for trained workers will be greater from year to year. Increased facilities for training such workers will no doubt be put into practice in each province.

During the year the International Health Division agreed to lend the services of one of its officers to the Government of India to be Director of the All-India Institute of Hygiene and Public Health, Calcutta.

Fellowships.—Six fellowships of one year each were awarded to medical officers and sanitary engineers for study in India and in foreign countries. One fellow was given an extension of time to complete his programme and seven returned to India to work in their respective departments after completing their studies.

Travel Grants.—In addition five senior public health officers were given travel grants to study special subjects in Europe for periods of one to three months each, and a junior medical officer was sent to Ceylon for two months' training in health unit work.

Articles on Researches.—Eight articles on researches in malaria were prepared by the staff and published in the Journal of the Malaria Institute of India.

Voluntary Organisations in Bombay Presidency.

97. In Bombay Presidency, of the many associations devoted to health activities special mention may be made of (1) the Bombay Presidency Baby and Health Week Association, (2) the Bombay Presidency Infant Welfare Society and (3) the Bombay Mofussil Maternity, Child Welfare and Health Council. These and a number of other organisations carried out a considerable amount of health propaganda at exhibitions and festivals. In addition the Bombay Presidency Baby and Health Week Association undertook research on balanced diets, the investigations being conducted along two lines, (1) nutritional and (2) analytical and experimental.

The activities of the Bombay Presidency Infant Welfare Society include parental, antivenereal and maternity and infant welfare work as well as the maintenance of a creche. As compared with the previous year the attendance at its centres increased by 3,000, a clear indication, as pointed out by Lady Lumley, its President, of the increasing recognition by the women of the benefits of the centres. In addition to these activities a Health Visitors' Institute is being maintained for the training of health visitors and the third batch of students passed out during the year.

The Bombay Mofussil Maternity, Child Welfare and Health Council has as its main object the coordination of the maternity and child welfare services in the mofussil, in order to prevent overlapping of work as well as to raise the standard of service at the welfare centres. During the year five new centres were added, thus making a total of 47 centres working in 13 districts of the province. In addition the Poona Health School was started by the Council on 15th April, 1938, with financial assistance from the Government of Bombay, the Indian Red Cross Society and the Poona District Committee of the Council.

Health Propaganda Board, Madras.

98. The Board was constituted in 1921 for the purpose of stimulating and promoting an interest in and a knowledge of, all matters connected with the general and personal health of the population of Southern India. The Board continued to maintain a library and a reading room. They deal with health subjects and are used by the public from different parts of Madras city. The Board arranged as usual an exhibition of its models and illustrated posters. The daily average attendance at this exhibition was over 600. An exhibition was also held at Tiruvottiyur in the Local Fund hospital compound for ten days and three films were exhibited to the public.

The Board started publishing a monthly health journal in English called "Arogyamargam" from April 1938 for disseminating correct and modern ideas on matters of health and sanitation. The Board also carried on an intensive campaign against tuberculosis by organising an anti-tuberculosis week in the City of Madras.

The Central Cooperative Antimalaria Society, Bengal.

99. This organisation was brought into existence in 1919 for the purpose of organising antimalarial cooperative societies throughout the rural areas of Bengal. Between 1919 and 1938 the number of such societies has grown to be three thousand. The central society has mainly concerned itself with two lines of work, (1) the formation of as many rural societies as possible and (2) the guidance of these societies in the carrying out of their antimalarial

work. Experienced malariologists have held that a factor of great importance in the causation of malaria in Bengal is man's interference with the natural drainage of the soil. In this province the two great rivers, the Brahmaputra and the Ganges, their tributaries and the net work of channels forming the deltaic system provide excellent natural drainage. One of the practices causing hindrance to such drainage has been the setting up of bunds in the beds of rivers in order to divert the course of water and thus render land available for cultivation. Attempts to remove these embankments often produce considerable opposition from the people. The central society, with the help of village societies, has held conferences in different parts of the province, which are attended by large gatherings of the people and at which representatives of the Irrigation Department are also present. These conferences have been greatly helpful in persuading the people to accept the removal of the embankments as an essential measure in the campaign against malaria. The rural cooperative societies have also taken an active part in the removal of vegetation from water courses as an antilarval measure.

Bengal Health Welfare Committee.

100. This committee has been established for coordinating the activities of six other committees engaged in health work, (1) Calcutta Maternity and Child Welfare Committee, (2) District Maternity and Child Welfare Committee, (3) Industrial Welfare Committee, (4) Sir John Anderson Health School Committee, (5) Bengal Health Education Committee, and (6) Calcutta Health Week Committee. As will be seen from the titles of these committees, they are mainly engaged in maternity and child welfare work and in the promotion of health education. The Calcutta Maternity and Child Welfare Committee had charge of six welfare centres in 1937 and in 1938 its activities expanded considerably by many new centres becoming affiliated to it and by the services of its Medical Officer being rendered available to various authorities for the organisation of welfare centres in several places in and around Calcutta. Outside Calcutta also the year under review recorded greater progress in the development of maternity and child welfare work through the activities of the committee for district work. Commenting on the work of these organisations the Director of Public Health, Bengal, stated, " although there is a very great deal of work that remains to be done, there is a noticeable appreciation by the public of the problems pertaining to the women and children of this province ".

The Association for the prevention of Blindness, Bengal.

101. A brief account of the activities of this Association was given in last year's report. During the year under review the activities of the Association were further extended, an innovation being the eye examination of children in schools and orphanages. The Association maintains two travelling eye dispensaries, each of which has two medical officers who carry on propaganda work through lectures, posters, pamphlets, magic lantern and cinema demonstrations on the prevention of blindness. Sample surveys of blindness in villages are undertaken. Whenever hospital accommodation was available, such as in sub-divisional hospitals or in private medical institutions, the travelling dispensaries carried out their treatment of patients in such hospitals. Operative work was also undertaken at all centres where indoor accommodation was available. One dispensary worked in the districts of Dinajpur, Rajshahi and Khulna while the other dispensary worked in Eastern Bengal in the districts of Mymensingh and Dacca. These dispensaries were so popular and successful in their work that periods of extension of stay in particular places

had to be sanctioned from time to time in order to meet the rush of patients. It is a credit to the local public that they contributed to the upkeep of the dispensaries during these extensions. That the work of the Association, which has now completed its ninth year, has been appreciated by the provincial Government is shown by the fact that a grant of Rs. 15,000 was sanctioned from provincial funds for the ensuing year. This sum will enable the Association to start two more travelling dispensaries in order to meet the increasing demand from the people for the treatment and cure of eye conditions.

E. COTTER, LIEUT.-COLONEL, I.M.S.,
Public Health Commissioner with the Government of India.

NEW DELHI;
The 10th November, 1940.

APPENDICES.

TABLE OF CONTENTS.

APPENDIX I.—RELATING TO SECTION I ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES.

TABLE.		PAGE.
A.	Estimated population on 30th June 1938 in rural and urban areas and by sex	192
B.	Estimated population by age and sex	193
C.	Births in rural and urban areas	194
D.	Births by months	194
E.	Deaths by months	195
F.	Death rates *per mille* by months	196
G.	Deaths by months in rural areas	196
H.	Deaths by months in urban areas	197
I.	Deaths according to age and sex	198
J.	Death rates according to age and sex	199
K.	Deaths according to age and sex in rural areas	200
L.	Deaths according to age and sex in urban areas	201
M.	Infantile mortality rate in certain towns in British India	202
N.	Infantile mortality in rural and urban areas	204
O.	Changes in, or additions to, the list of notifiable diseases given on pages 265—274 of the Annual Report of the Public Health Commissioner for 1937	205
P.	Crude and standardised death rates *per mille* (direct method) for different provinces in India	206
Q.	Estimated population of Assam by age and sex	208
R.	Death rates according to age and sex in Assam	209

APPENDIX II.—RELATING TO SECTION II ON THE HISTORY OF THE CHIEF DISEASES.

A.	Deaths and rates *per mille* from certain causes or groups of causes of mortality	212
B.	Deaths and rates *per mille* from certain causes or groups of causes of mortality in rural and urban areas	213
C.	Deaths from cholera from 1905 to 1938	215
D.	Deaths and rates *per mille* from cholera in rural and urban areas	216
E.	Deaths from cholera by months	216
F.	Deaths from plague by months in—	
	(*i*) British provinces	217
	& (*ii*) Indian States and Agencies	217
G.	Deaths and rates *per mille* from smallpox in rural and urban areas	218
H.	Deaths from smallpox by months	218
I.	Deaths and rates *per mille* from fevers and malaria in rural and urban areas	219
J.	Deaths from fevers by months	219
K.	Deaths and rates *per mille* from dysentery and diarrhœa in rural and urban areas and by sex	220
L.	Deaths from dysentery and diarrhœa by months	220
M.	Deaths and rates *per mille* from respiratory diseases in rural and urban areas and by sex	221
N.	Deaths from respiratory diseases by months	221
O.	Quinine and cinchona febrifuge issued in various provinces	222

APPENDIX III.—RELATING TO SECTION III ON MATERNITY AND CHILD WELFARE.

TABLE.		PAGE
A.	Maternal death rates per 1,000 of live and still births for certain towns in British India	224
B.	Maternity and child welfare centres in rural and urban areas	226

APPENDIX IV.—RELATING TO SECTION IV ON THE HEALTH ACTIVITIES OF PROVINCIAL GOVERNMENTS AND SOME OTHER HEALTH ADMINISTRATIONS.

A.	Expenditure on public health by the Government of India and provincial Governments	228
B.	Distribution of health staffs in rural and urban areas	229

APPENDIX V.—RELATING TO SECTION VI ON VACCINATION AGAINST SMALLPOX.

Vaccination operations performed in British India and in different provinces . . . 232

APPENDIX VI.—RELATING TO SECTION VII ON PUBLIC HEALTH WORKS.

Number of towns having protected water supplies in different provinces . . . 234

APPENDIX VII.—RELATING TO SECTION VIII ON LABORATORIES AND MEDICAL RESEARCH.

List of scientific papers by research workers under the Government of India, the Indian Research Fund Association, provincial Governments and Indian States during 1938—

A.	Papers published in the Indian Journal of Medical Research	236
B.	Papers published in the Indian Medical Gazette	241
C.	Papers published in the Journal of the Malaria Institute of India	247
D.	Papers published in other journals	249

APPENDIX VIII.—RELATING TO SECTION IX ON THE HEALTH OF JAILS IN INDIA.

Sickness and mortality of all classes of prisoners from principal diseases in district and central jails . . . 256

Appendix I

relating to

Section I.

Deaths in the rural areas of British India and the provinces are given in table G distributed according to months and in table K by age and sex. The total figure for British India does not, however, correspond in the two cases. This is because, for Madras Presidency, the figures shown in table G are for the area exclusive of municipalities alone, whilst those of table K relate to an area excluding municipalities and rural towns. For this reason the total figure in table G is greater than that of table K by 57,161.

Deaths in urban areas are given in tables H and L. For the above reason the total figure in table L is greater by 57,161 than that in table H.

The figures in tables G and H together equal those in K and L.

Owing to certain errors discovered in the population figures hitherto used for the registration areas of Assam, new figures for the estimated populations for the period 1931-37 and mortality rates for specific age periods for the same years have been calculated and are shown in tables Q and R of this Appendix.

TABLE A.—ESTIMATED POPULATION ON 30TH JUNE, 1938, IN RURAL AND URBAN AREAS AND BY SEX.

	Rural.	Urban.	Total.	Male.	Female.	Area in square miles.	Density per square mile.
BRITISH INDIA . . .	249,399,545	26,141,268	275,540,813	141,922,596	133,618,217	762,664	361
N.-W. F. P. . . .	2,197,215	341,844	2,539,059	1,376,087	1,162,972	13,308	191
Punjab	23,108,979	3,488,677	26,597,656	14,435,399	12,162,257	96,614	275
Delhi	220,101	495,318	715,419	411,447	303,972	578	1,238
U. P.	47,046,741	5,947,964	52,994,705	27,830,785	25,163,920	106,248	499
Bihar . . .	33,679,317	1,405,348	35,084,665	17,557,944	17,526,721	69,348	506
Orissa . . .	7,027,199	224,707	7,251,906	3,459,301	3,792,605	21,492	337
Bengal	49,046,946	3,536,595	52,583,541	27,334,173	25,249,368	72,514	725
C. P. . . .	14,902,163	1,846,318	16,748,481	8,354,672	8,393,809	98,730	170
Bombay	15,896,864	3,723,871	19,620,735	10,162,924	9,457,811	76,389	257
Sind	3,508,186	757,378	4,265,564	2,393,625	1,871,939	46,663	91
Madras	43,906,312	3,966,098	47,872,410	23,721,303	24,151,107	125,438	382
Coorg	154,719	9,390	164,109	90,745	73,364	1,593	103
Assam . . .	8,293,718	213,256	8,506,974	4,477,800	4,029,174	31,382	271
Ajmer-Merwara . .	411,085	184,504	595,589	316,391	279,198	2,367	252

Table B.—Estimated population on 30th June, 1938, by Age and Sex.

	N.-W. F. P.		Punjab.		Delhi.		U. P.		Bihar.		Orissa.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	40,792	33,439	497,199	493,156	11,292	11,330	817,842	821,250	420,957	430,671	95,098	98,673
1—5 years	167,920	162,348	1,642,448	1,588,423	38,236	37,930	3,178,249	3,210,612	2,157,616	2,293,321	377,089	400,042
5—10 years	195,664	158,063	1,895,499	1,650,950	43,835	37,677	3,550,645	3,066,693	2,518,896	2,313,953	423,922	414,33
10—15 years	174,646	130,756	1,761,262	1,454,359	44,188	35,752	3,290,543	2,687,931	2,167,849	1,920,453	402,510	380,908
15—20 years	121,151	103,019	1,348,706	1,121,648	44,215	33,009	2,519,519	2,207,445	1,429,429	1,479,774	327,631	356,811
20—30 years	236,964	222,174	2,502,934	2,115,459	90,816	61,937	4,970,754	4,592,477	2,986,710	3,145,569	617,244	726,419
30—40 years	189,225	158,178	1,879,948	1,482,789	66,939	40,014	4,028,524	3,601,299	2,531,256	2,515,455	504,936	581,803
40—50 years	119,844	95,726	1,296,407	1,032,696	39,234	23,658	2,810,429	2,442,180	1,724,736	1,644,686	365,424	410,353
50—60 years	72,045	54,953	853,098	654,488	19,800	13,357	1,616,669	1,471,962	977,897	992,515	223,884	256,805
60 years and over	57,836	39,316	757,898	568,289	12,892	9,308	1,047,611	1,062,071	642,598	790,324	121,563	166,459

	Bengal.		O. P.		Bombay.		Sind.		Madras.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	871,490	874,257	289,183	296,848	294,837	299,631	59,158	55,903	658,252	679,271
1— 5 years	3,164,910	3,254,087	989,731	1,042,537	1,143,277	1,172,718	272,720	260,792	2,751,485	2,829,622
5—10 years	3,739,450	3,316,640	1,074,358	1,041,215	1,313,116	1,217,499	314,100	244,412	3,107,384	3,040,926
10—15 years	3,271,807	2,921,224	972,247	923,253	1,186,058	1,065,300	270,855	190,482	2,857,589	2,709,177
15—20 years	2,394,979	2,668,117	735,863	775,201	889,565	879,607	207,292	161,551	2,072,561	2,210,622
20—30 years	5,006,854	4,988,478	1,481,564	1,516,475	1,839,262	1,762,928	469,199	378,492	3,981,200	4,561,728
30—40 years	4,048,468	3,239,924	1,162,965	1,140,448	1,568,244	1,304,618	381,747	270,887	3,383,379	3,343,307
40—50 years	2,559,032	1,987,262	833,319	783,705	998,712	860,208	229,696	161,246	2,369,327	2,221,63
50—60 years	1,365,807	1,165,999	482,582	480,093	564,399	522,759	114,523	86,211	1,436,117	1,415,68
60 years and over	911,376	838,380	332,860	394,039	365,459	372,548	74,335	61,873	1,104,009	1,139,155 61

	Coorg.		Assam.		Ajmer-Merwara.		British India.	
	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	2,181	2,204	141,139	142,798	9,910	9,916	4,209,280	4,254,432
1—5 years	7,555	7,733	579,268	599,200	35,266	35,289	16,505,770	16,804,649
5—10 years	9,545	9,166	605,298	549,615	38,905	33,988	18,830,617	17,095,129
10—15 years	10,012	9,086	514,545	460,250	36,764	30,808	16,960,870	14,919,689
15—20 years	9,146	7,573	369,438	410,452	31,593	27,622	12,501,088	12,442,451
20—30 years	19,656	15,367	795,769	775,646	59,058	50,694	25,057,984	24,913,848
30—40 years	16,370	10,399	669,305	508,179	42,652	36,892	20,473,058	18,234,192
40—50 years	9,395	5,974	424,169	299,723	33,745	27,506	13,813,469	11,996,561
50—60 years	4,426	3,475	230,920	169,749	18,889	15,834	7,981,056	7,303,855
60 years and over	2,509	2,437	147,949	113,562	9,609	10,649	5,588,504	5,563,416

Table C.—Births in Rural and Urban Areas.

	Rural.	Urban.	Total	Rate p. m. Rural.	Urban.	Total.
British India	8,365,602	1,032,409	9,398,011	33·5	39·5	34·1
N.-W. F. P.	61,987	9,990	71,977	28·2	29·2	28·3
Punjab	1,033,071	132,766	1,165,837	44·7	38·1	43·8
Delhi	12,071	22,069	34,140	54·8	44·6	47·7
U. P.	1,531,352	249,766	1,781,118	32·5	42·0	33·6
Bihar	1,090,305	25,873	1,116,178	32·4	18·4	31·8
Orissa	233,406	5,391	238,797	33·2	24·0	32·9
Bengal	1,441,523	79,731	1,521,254	29·4	22·5	28·9
C. P.	583,284	78,501	661,785	39·1	42·5	39·5
Bombay	623,409	135,086	758,495	39·2	36·3	38·7
Sind	50,358	26,911	77,269	14·4	35·5	18·1
Madras	1,458,513	251,032	1,709,545	33·2	63·3	35·7
Coorg	3,289	496	3,785	21·3	52·8	23·1
Assam	230,642	6,538	237,180	27·8	30·7	27·9
Ajmer-Merwara	12,392	8,259	20,651	30·1	44·8	34·7

Table D.—Total Births by Months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	819,348	715,770	773,040	727,664	692,419	680,876	733,209	779,461	841,051	895,562	873,212	866,399
N.-W. F. P.	6,623	5,680	6,501	5,769	4,986	4,909	5,901	5,793	5,922	6,488	6,152	7,253
Punjab	102,866	88,176	90,927	75,627	73,653	81,132	99,980	104,714	109,775	115,783	111,396	111,808
Delhi	2,633	2,104	2,290	1,961	2,322	2,589	3,228	3,159	3,654	3,554	3,515	3,131
U. P.	160,333	138,355	126,932	128,272	115,079	122,713	148,207	163,492	174,211	174,056	161,271	168,197
Bihar	102,965	84,121	89,208	93,896	88,860	76,211	75,682	92,026	107,823	103,663	101,043	100,680
Orissa	19,594	17,175	20,829	21,930	23,390	21,162	20,462	19,142	17,426	18,835	19,524	19,328
Bengal	153,548	141,719	160,928	131,053	107,518	92,397	80,765	81,301	103,828	144,289	163,318	160,590
C. P.	52,680	47,430	57,147	54,827	51,682	47,644	50,985	59,291	63,596	65,661	57,139	53,703
Bombay	58,018	54,274	65,542	60,448	58,739	59,892	63,990	67,589	69,544	70,239	65,914	64,806
Sind	7,507	5,859	5,410	4,554	5,065	5,157	5,938	6,646	7,158	8,984	7,985	7,006
Madras	125,255	108,018	126,478	130,512	142,940	149,700	162,398	158,730	157,950	157,752	147,762	142,050
Coorg	284	254	293	303	341	345	360	370	363	306	278	288
Assam	25,319	21,153	19,159	17,228	16,585	15,400	13,638	15,292	17,915	23,781	25,714	25,996
Ajmer-Merwara	1,723	1,452	1,396	1,284	1,259	1,625	1,675	1,916	1,886	2,171	2,201	2,063

Table E.—Total Deaths by Months.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p. m.
British India	546,025	455,369	485,475	530,320	583,641	549,695	569,130	589,942	575,134	577,802	606,953	615,634	6,685,120	24·3
N.-W. F. P.	6,158	4,631	4,349	3,903	5,087	4,554	4,126	3,692	3,319	3,985	4,111	6,067	53,982	21·3
Punjab	54,117	43,535	42,067	48,816	77,206	66,036	51,499	45,992	43,849	45,005	48,977	55,600	622,699	23·4
Delhi	1,314	989	1,184	1,483	2,332	1,639	1,364	1,275	1,171	1,010	1,236	1,735	16,732	23·4
U. P.	97,352	80,400	81,674	111,293	135,721	136,992	116,851	106,446	98,433	94,207	91,748	98,871	1,249,988	23·6
Bihar	59,287	47,007	52,921	65,405	65,878	62,816	69,226	72,188	70,171	63,717	70,842	64,275	763,733	21·8
Orissa	18,325	15,184	17,355	15,760	15,853	16,092	19,300	20,186	16,759	14,985	18,440	20,347	208,586	28·8
Bengal	119,669	98,736	108,586	103,234	85,153	81,885	86,985	91,419	104,406	128,598	155,014	152,201	1,315,886	25·0
C. P.	35,594	34,032	39,339	45,167	55,631	39,488	54,098	78,011	74,388	64,882	58,576	50,095	629,301	37·6
Bombay	39,750	39,155	42,518	43,587	39,489	39,467	52,438	58,336	53,823	48,584	45,192	45,048	547,387	27·9
Sind	5,942	4,542	4,451	3,956	4,035	3,586	3,185	3,142	3,185	3,740	4,187	4,134	48,085	11·3
Madras	91,932	73,180	77,414	73,520	81,021	79,902	94,296	94,607	90,532	91,421	87,836	96,391	1,032,052	21·6
Coorg	364	252	357	287	317	416	415	330	331	349	288	280	3,986	24·3
Assam	14,843	12,418	11,697	12,150	14,079	15,892	14,324	13,086	13,682	16,466	19,607	19,523	177,767	20·9
Ajmer-Merwara	1,378	1,308	1,563	1,759	1,839	930	1,023	1,232	1,085	853	899	1,067	14,936	25·1

Table F.—Death rates *per mille* by months.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	**23·8**	**19·8**	**21·1**	**23·1**	**25·4**	**23·9**	**24·8**	**25·7**	**25·1**	**25·2**	**26·4**	**26·8**
N. W. F. P.	29·1	21·9	20·6	18·4	24·0	21·5	19·5	17·4	15·7	18·8	19·4	28·7
Punjab	24·4	19·6	19·0	22·0	34·8	29·8	23·2	20·8	19·8	20·3	22·1	25·1
Delhi	22·0	16·6	19·9	24·9	39·1	27·5	22·9	21·4	19·6	16·9	20·7	29·1
U. P.	22·0	18·2	18·5	25·2	30·7	31·0	26·5	24·1	22·2	21·8	20·8	22·4
Bihar	20·3	16·1	18·1	22·4	22·5	21·5	23·7	24·7	24·0	21·8	24·2	22·0
Orissa	30·3	25·1	28·7	26·1	26·2	26·6	31·9	33·4	27·7	24·8	30·5	33·7
Bengal	27·3	22·5	24·8	23·6	19·4	18·7	19·9	20·9	23·8	29·3	35·4	34·7
C. P.	25·5	24·4	28·2	32·4	39·9	28·3	38·8	55·9	53·3	46·5	42·0	35·9
Bombay	24·3	23·9	26·0	26·7	24·2	24·1	32·1	35·7	32·9	29·7	27·6	27·6
Sind	16·7	12·8	12·5	11·1	11·4	10·1	9·0	8·8	9·0	10·5	11·8	11·6
Madras	23·0	18.3	19·4	18·4	20·3	20·0	23·6	23·7	22·7	22·9	22·0	24·2
Coorg	26·6	18·4	26·1	21·0	28·2	30·4	30·3	24·1	24·2	25·5	21·1	20·5
Assam	20·9	17·5	16·5	17·1	19·9	22·4	20·2	18·5	19·3	23·2	27·7	27·5
Ajmer-Merwara	27·8	26·4	31·5	35·4	37·1	18·7	20·6	24·8	21·9	17·2	18·1	21·5

Table G.—Deaths by months in rural areas.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p. m.
British India	**490,717**	**407,648**	**431,276**	**469,546**	**516,048**	**494,238**	**507,160**	**526,767**	**517,992**	**523,919**	**552,165**	**559,257**	**5,996,733**	**24·0**
N.-W. F. P.	5,375	4,188	3,865	3,410	4,362	3,868	3,583	3,248	2,989	3,471	3,682	5,483	47,519	21·6
Punjab	48,293	39,075	37,753	42,553	68,356	58,532	44,816	40,165	38,677	40,074	43,587	48,884	550,765	23·8
Delhi	442	298	320	479	846	554	506	425	356	361	483	718	5,788	26·3
U. P.	84,469	69,916	68,401	92,936	113,664	120,720	101,017	90,165	84,150	81,548	79,343	86,161	1,072,490	22·8
Bihar	57,811	45,799	51,611	68,787	64,279	61,308	67,613	70,378	68,558	62,237	69,379	62,903	745,663	22·1
Orissa	17,938	14,881	17,011	15,439	15,516	15,746	18,886	19,820	16,389	14,688	17,997	19,910	204,216	29·1
Bengal	112,231	92,264	101,584	96,515	78,926	76,477	80,426	84,862	97,869	121,577	157,272	144,601	1,234,604	25·2
C. P.	31,671	30,173	34,842	40,016	49,883	35,600	46,666	70,048	67,028	58,433	52,537	44,783	561,090	37·7
Bombay	30,832	29,570	31,878	33,426	30,351	31,334	41,555	47,009	44,206	39,798	36,214	36,163	431,836	27·2
Sind	4,365	3,342	3,199	2,739	2,608	2,375	2,138	2,026	2,076	2,587	3,027	2,717	33,399	9·5
Madras	82,116	64,901	68,223	65,287	72,135	71,761	85,015	84,907	81,467	82,295	78,774	86,998	923,879	21·0
Coorg	317	223	304	251	275	371	373	284	284	310	255	247	3,494	22·6
Assam	14,459	12,202	11,424	11,879	13,746	15,596	14,010	12,739	13,360	16,115	19,156	19,184	173,870	21·0
Ajmer-Merwara	898	821	861	829	901	536	556	691	583	430	459	555	8,120	19·8

TABLE H.—DEATHS BY MONTHS IN URBAN AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p. m.
BRITISH INDIA . .	55,308	47,721	54,199	60,774	67,593	55,457	61,970	63,175	57,142	53,883	54,788	56,377	688,387	26·3
N.-W. F. P. . .	783	448	484	493	725	686	543	444	330	514	429	584	6,463	18·9
Punjab . . .	5,824	4,460	4,314	6,263	8,850	7,504	6,683	5,827	5,172	4,931	5,390	6,716	71,934	20·6
Delhi . . .	872	691	864	1,004	1,486	1,085	858	850	815	649	753	1,017	10,944	22·1
U. P. . . .	12,883	10,484	13,273	18,357	22,057	16,272	15,834	16,281	14,283	12,659	12,405	12,710	177,498	29·8
Bihar . . .	1,476	1,208	1,310	1,618	1,599	1,508	1,613	1,810	1,613	1,480	1,463	1,372	18,070	12·9
Orissa . . .	387	303	344	321	337	346	414	366	370	302	443	437	4,370	19·4
Bengal . .	7,438	6,472	7,002	6,719	6,227	5,408	6,559	6,557	6,537	7,021	7,742	7,600	81,282	23·0
C. P. . . .	3,923	3,859	4,497	5,151	5,748	4,428	7,432	7,968	7,360	6,449	6,039	5,362	68,211	30·9
Bombay .	9,418	9,585	10,640	10,161	9,138	8,133	10,883	11,327	9,617	8,786	8,978	8,885	115,551	31·0
Sind . . .	1,577	1,200	1,252	1,217	1,227	1,211	1,047	1,116	1,109	1,153	1,160	1,417	14,686	19·4
Madras . .	9,816	8,279	9,191	8,283	8,886	8,141	9,281	9,700	9,055	9,126	9,062	9,393	108,173	27·3
Coorg . .	47	29	53	36	42	45	42	46	47	39	33	33	492	52.4
Assam . . .	384	216	273	271	333	296	314	347	322	351	451	339	3,897	18·3
Ajmer-Merwara .	480	487	702	930	938	394	467	541	502	423	440	512	6,816	36·9

Table I.—Deaths according to age and sex.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	**853,619**	**711,577**	**670,223**	**631,308**	**196,193**	**175,827**	**108,057**	**92,341**	**100,118**	**121,798**
N.-W. F. P.	6,366	4,724	5,768	5,066	1,805	1,684	1,151	1,027	1,175	1,075
Punjab	106,691	87,817	68,859	62,272	16,330	14,488	11,296	10,879	10,459	10,726
Delhi	2,751	2,359	1,893	1,709	350	320	192	249	255	393
U. P.	147,566	117,123	156,562	135,214	33,398	27,708	20,385	17,340	17,088	16,085
Bihar	74,073	59,715	84,362	78,306	26,911	22,058	15,162	10,709	13,834	12,015
Orissa	28,155	24,833	17,310	17,918	5,195	4,785	2,443	2,172	2,786	3,541
Bengal	152,159	128,764	105,221	106,934	50,488	46,668	25,226	19,786	23,008	35,594
C. P.	85,732	71,902	68,150	61,050	18,711	16,194	9,648	8,171	9,707	11,275
Bombay	71,532	60,568	64,712	66,111	12,566	13,199	5,357	5,629	4,927	6,819
Sind	5,191	4,184	4,245	3,692	1,562	1,318	918	749	839	816
Madras	154,697	129,233	76,907	77,379	21,842	21,288	12,143	12,022	12,026	16,948
Coorg	341	296	223	241	87	80	68	60	123	132
Assam	21,074	17,983	14,103	13,548	6,665	5,766	3,920	3,337	3,811	5,247
Ajmer-Merwara	2,291	2,076	1,908	1,868	283	271	148	151	130	232

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	**238,988**	**307,092**	**253,468**	**241,746**	**265,929**	**197,121**	**271,223**	**214,473**	**527,678**	**501,341**
N.-W. F. P.	2,454	2,427	2,396	2,359	2,300	1,885	2,364	1,620	3,633	2,703
Punjab	16,780	18,744	15,945	16,038	17,520	14,577	19,648	15,650	49,053	38,927
Delhi	559	845	469	593	501	418	492	381	1,099	909
U. P.	43,775	48,148	45,947	43,772	51,260	37,247	55,801	41,200	103,446	90,023
Bihar	34,598	34,126	35,959	29,681	33,872	25,212	34,315	30,975	52,910	54,880
Orissa	7,397	10,281	8,273	8,262	8,292	7,124	9,907	9,672	13,981	16,309
Bengal	57,179	84,784	60,540	54,780	59,964	42,473	53,983	42,256	87,200	78,879
C. P.	21,547	28,312	1,916	21,635	22,678	17,246	23,270	19,416	45,391	47,350
Bombay	15,274	20,792	16,770	16,791	19,582	13,469	21,066	14,793	48,771	48,659
Sind	2,341	2,505	2,641	2,199	2,793	1,529	2,388	1,002	4,307	2,866
Madras	28,884	43,076	33,510	36,855	38,714	29,759	39,950	31,598	105,392	109,829
Coorg	225	290	345	250	324	171	206	174	187	163
Assam	7,593	12,199	8,392	8,132	7,597	5,670	7,163	5,339	11,293	8,935
Ajmer-Merwara	382	563	365	399	532	346	670	397	1,015	909

M.—Males. F.—Females.

TABLE J.—DEATH RATES ACCORDING TO AGE AND SEX.

	*Under 1 year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	175·8	157·6	40·6	37·4	10·4	10·3	6·4	6·2	8·0	9·8
N.-W. F. P.	154·3	153·8	34·3	31·2	9·2	10·7	6·6	7·9	9·7	10·4
Punjab	173·4	159·5	41·9	39·2	8·6	8·8	6·4	7·5	7·8	9·6
Delhi	155·7	143·2	49·5	45·1	8·0	8·5	4·8	7·0	5·8	11·9
U. P.	156·1	140·1	49·3	42·1	9·4	9·0	6.2	6·5	6·8	7·7
Bihar	129·7	109·6	39·1	34·1	10·7	9·5	7·0	5·6	9·7	8 1
Orissa	230·2	218·2	45·9	44·8	12·3	11·5	6·1	5·7	8·4	9·9
Bengal	193·0	175·7	33·2	32·9	13·5	14·1	7·7	6·8	9·6	13·3
C. P.	251·8	223·7	68·9	58·6	17·4	15·6	9·9	8·9	13·2	14·5
Bombay	183·6	164·2	56·6	56·4	9·6	10·8	4·5	5·3	5·5	7·8
Sind	119·5	123·7	15·6	14·2	5·0	5·4	3·4	4.0	4·0	5·1
Madras	177·1	154·6	28·0	27·3	7·0	7·0	4·2	4·4	5·8	7·7
Coorg	172·1	164·1	29·5	31·2	9·1	8·7	6·8	6·6	18·4	17·4
Assam	172·2	156·6	24·3	22·6	11·0	10·5	7·6	7·3	10·3	12·8
Ajmer-Merwara	206·0	217·9	54·1	52·9	7·3	8·0	4·0	4·9	4·1	8·4

*Ratios have been worked out per 1,000 of live births.

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	9·5	12·3	12·4	13·3	19·3	16·4	34·0	29 4	94·4	90·1
N.-W. F.	10·4	10·9	12·7	14·9	19·2	19·7	32·8	29·5	62·8	68·8
Punjab	6·7	8·9	8·5	10·8	13·5	14·1	23·0	23·9	64·7	68·5
Delhi	6·2	13·6	7·0	14·8	12·8	17·5	24·8	28·5	85·2	97·7
U. P.	8·8	10·5	11·4	12·2	18 2	15·3	34·5	28·0	98·7	84·8
Bihar	11·6	10·8	14·2	11·8	19·6	15·3	35·1	31·2	82·8	69·4
Orissa	12·0	14·2	16·4	14·2	22·7	17·4	44·3	37·7	115·0	98·0
Bengal	11·4	17·0	15·0	16·9	23·4	21·4	39·5	36·2	95·7	94·6
C. P.	14·5	18·7	18·8	19·0	27·2	22·0	48·2	40·4	136·4	120·2
Bombay	8·3	11:8	10·7	12·9	19·6	15·7	37·3	28·3	133·5	130·6
Sind	5·0	6·6	6·9	8·1	12·2	9·5	20·9	11·6	57·9	46·3
Madras	7·3	9·4	9·9	11·0	16·3	13·4	27·8	22·3	95·5	96·4
Coorg	11·4	18·9	21·1	24·0	34·5	28·6	46·5	50·1	74·5	66·9
Assam	9·5	15·7	12·5	16·0	17·9	18·9	31·0	31·5	76·3	78·7
Ajmer-Merwara	6·5	11·1	8·6	10·8	15·8	12·6	35·5	25·1	105·6	85·1

M.—Males. F.—Females.

TABLE K.—DEATHS ACCORDING TO AGE AND SEX IN RURAL AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	751,752	621,640	599,777	562,435	180,859	161,327	99,313	82,199	89,790	106,044
N.-W. F. P.	5,597	4,108	5,109	4,488	1,639	1,511	1,046	883	1,026	893
Punjab	94,549	77,247	61,489	55,168	14,835	12,996	10,259	9,528	9,289	9,080
Delhi	958	836	696	627	119	125	74	64	86	58
U. P.	119,976	93,744	135,216	114,217	29,019	24,366	18,549	14,736	15,227	13,118
Bihar	72,340	58,329	82,668	76,855	26,345	21,601	14,760	10,399	13,405	11,569
Orissa	27,726	24,449	17,077	17,678	5,097	4,696	2,387	2,137	2,649	3,465
Bengal	144,153	122,073	100,579	102,510	48,189	44,739	23,801	18,616	21,308	33,813
C. P.	75,594	63,398	61,530	54,818	17,310	14,784	8,826	7,198	8,754	9,665
Bombay	54,921	46,386	52,459	53,631	10,492	11,094	4,385	4,472	3,623	4,807
Sind	2,865	2,267	2,896	2,498	1,291	1,087	761	590	617	524
Madras	131,064	109,984	64,914	65,410	18,833	18,428	10,453	10,172	9,903	13,689
Coorg	328	285	212	231	82	76	55	56	109	127
Assam	20,653	17,608	13,852	13,314	6,535	5,664	3,857	3,274	3,716	5,149
Ajmer-Merwara	1,028	926	1,080	990	173	160	100	74	78	87

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	209,491	268,277	226,175	216,246	237,249	178,536	242,803	195,261	466,803	443,595
N.-W. F. P.	2,114	2,127	2,145	2,152	2,023	1,706	2,042	1,445	3,143	2,322
Punjab	14,621	15,863	14,051	14,088	15,461	13,062	17,332	13,978	43,463	34,406
Delhi	174	196	158	219	181	173	171	153	391	329
U. P.	38,963	39,612	41,505	38,455	46,209	33,453	50,297	37,278	89,852	77,708
Bihar	33,700	33,149	34,968	28,967	32,998	24,692	33,530	30,390	51,462	53,536
Orissa	7,177	10,041	8,031	8,101	8,018	6,965	9,625	9,475	13,566	15,856
Bengal	50,238	78,410	55,689	51,124	55,613	39,519	50,167	39,381	81,273	73,409
C. P.	19,156	24,617	19,532	19,382	20,329	15,789	20,763	17,646	40,063	41,936
Bombay	10,794	15,108	12,379	12,952	14,776	10,959	16,553	12,181	39,767	40,097
Sind	1,712	1,780	1,993	1,760	2,069	1,189	1,718	730	3,150	1,902
Madras	23,091	34,912	27,156	30,602	31,565	25,068	33,000	26,912	88,887	92,675
Coorg	171	246	235	223	240	157	181	160	170	150
Assam	7,332	11,937	8,105	7,978	7,356	5,568	6,987	5,258	11,016	8,711
Ajmer-Merwara	248	279	228	243	321	236	437	274	600	558

M.—Males. F.—Females.

Table L.—Deaths according to age and sex in urban areas.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	**106,867**	**89,937**	**70,446**	**68,873**	**15,334**	**14,500**	**8,744**	**10,142**	**10,328**	**15,754**
N.-W. F. P.	769	616	659	578	160	173	105	144	149	182
Punjab	12,142	10,570	7,370	7,104	1,495	1,492	1,037	1,351	1,170	1,646
Delhi	1,798	1,523	1,197	1,082	231	195	118	185	169	335
U. P.	27,590	23,379	21,346	20,997	3,479	3,342	1,836	2,604	1,861	3,867
Bihar	1,733	1,386	1,694	1,451	566	457	402	370	429	446
Orissa	429	384	238	240	98	89	56	85	87	76
Bengal	8,006	6,691	4,642	4,424	2,299	1,929	1,425	1,170	1,700	1,781
C. P.	10,138	8,504	6,620	6,232	1,401	1,410	822	978	953	1,610
Bombay	16,611	14,182	12,253	12,480	2,074	2,105	972	1,157	1,304	2,012
Sind	2,326	1,917	1,349	1,194	271	231	157	159	222	292
Madras	23,653	19,249	11,993	11,969	3,009	2,860	1,690	1,850	2,123	3,259
Coorg	13	11	11	10	5	4	18	4	14	5
Assam	421	375	251	234	130	102	63	63	95	98
Ajmer-Merwara	1,208	1,150	828	878	110	111	48	77	52	145

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	**29,497**	**38,815**	**27,293**	**25,500**	**28,680**	**18,585**	**28,420**	**19,212**	**60,875**	**57,746**
N.-W. F. P.	340	300	251	207	277	179	322	175	490	381
Punjab	2,159	2,881	1,894	1,950	2,059	1,515	2,316	1,672	5,590	4,521
Delhi	385	649	311	374	320	240	321	228	708	580
U. P.	4,812	8,536	4,442	5,817	4,961	3,764	5,504	3,922	13,594	12,315
Bihar	898	977	991	714	874	520	785	585	1,448	1,344
Orissa	220	240	242	161	274	159	282	197	415	458
Bengal	6,941	6,374	4,851	3,656	4,351	2,954	3,816	2,875	5,927	5,470
C. P.	2,391	3,695	2,384	2,253	2,349	1,457	2,507	1,770	5,328	5,414
Bombay	4,480	5,684	4,391	3,839	4,806	2,510	4,518	2,612	9,004	8,562
Sind	629	725	648	439	724	340	670	272	1,157	964
Madras	5,793	8,164	6,354	6,253	7,149	4,691	6,950	4,686	16,505	17,154
Coorg	54	44	110	27	84	14	25	14	17	13
Assam	261	262	287	154	241	102	176	81	277	224
Ajmer-Merwara	134	284	137	156	211	110	233	123	415	351

M.—Males, F.—Females.

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGE TOWNS DURING 1938.

Towns.	Rate *p.m.* of live births.
N.-W. F. Province.	
Peshawar	163·2
Dera Ismail Khan	120·0
Delhi.	
Delhi City	156·0
New Delhi	115·7
United Provinces.	
Dehra Dun	223·2
Saharanpur	302·8
Hardwar Union	318·6
Muzaffarnagar	203·3
Meerut	143·1
Khurja	255·2
Aligarh	195·3
Hathras	274·3
Muttra	223·5
Agra	200·1
Bareilly	142·0
Budaun	219·2
Moradabad	179·3
Amroha	225·8
Sambhal	247·7
Shahjahanpur	214·4
Pilibhit	232·5
Farrukhabad-*cum*-Fatehgarh	296·2
Etawah	321·1
Cawnpore	335·8
Allahabad	195·8
Jhansi	265·7
Benares	222·3
Mirzapur-Bindhachal	174·2
Jaunpur	171·2
Gorakhpur	188·0
Lucknow	226·4
Fyzabad-Ajodhya	145·2
Bahraich	189·8
Bengal Presidency.	
Asansol	103·1
Bankura	57·3
Hooghly-Chinsura	158·2
Serampur	152·2
Howrah	261·9
South Suburban	250·9
Baranagar	213·4

Towns.	Rate *p.m.* of live births.
Bengal Presidency—contd.	
Titagarh	179·5
Naihati	85·9
Bhatpara	239·6
Calcutta	218·6
Sirajganj	186·2
Dacca	179·4
Narayanganj	278·3
Mymensingh	79·2
Barisal	202·5
Chittagong	213·7
Central Provinces.	
Nagpur	264·2
Jubbulpore	280·1
Saugor	285·6
Khandwa	266·8
Burhanpur	248·1
Raipur	198·6
Bilaspur	203·6
Amraoti	198·3
Akola	273·0
Bombay Presidency.	
Bombay	267·9
Jalgaon	196·5
Dhulia	125·8
Surat	268·4
Broach	148·3
Nadiad	285·3
Godhra	184·4
Ahmedabad	283·0
Ahmednagar	174·9
Poona	269·0
Nasik	372·9
Malegaon	187·1
Bandra	151·0
Kurla	229·6
Belgaum	137·5
Gadag-Betigeri	174·0
Bijapur	121·0
Sholapur	244·5
Sind.	
Karachi	149·6
Hyderabad	192·6
Sukkur	96·9
Shikarpur	219·3

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGE TOWNS DURING 1938 *contd.*

Towns.	Rate *p.m.* of live births.	Towns.	Rate *p.m.* of live births.
Madras Presidency.		*Madras Presidency*—contd.	
Bellary	179·4	Tellicherry	153·6
Adoni	123·9	Nellore	95·1
Conjeeveram	137·9	Vellore	145·2
Saidapet	178·4	Virudhunagar	180·4
Coimbatore	134·7	Srivilliputtur	161·9
Erode	111·3	Salem	134·6
Cocanada	261·5	Cuddalore	143·7
Rajahmundry	244·6	Tanjore	156·3
Guntur	219·7	Kumbakonam	124·8
Tenali	192·5	Negapatam	186·3
Bezwada	199·5	Mayavaram	113·7
Masulipatam	211·9	Tuticorin	203·0
Madras	222·1	Tinnevelly	221·7
Madura	186·7	Palamcottah	157·5
Dindigul	164·9	Trichinopoly	135·7
Calicut	127·4	Vizagapatam	241·7
Palghat	142·7	Vizianagram	203·1
Cannanore	143·8		

TABLE N.—INFANTILE MORTALITY IN RURAL AND URBAN AREAS.

	Rural.		Urban.	
	Deaths.	Rate *p. m.* of live births.	Deaths.	Rate *p. m.* of live births.
BRITISH INDIA	1,373,392	164·2	196,804	190·6
N.-W. F. P.	9,705	156·6	1,385	138·6
Punjab	171,796	166·3	22,712	171·1
Delhi	1,794	148·6	3,316	150·3
U. P.	213,720	139·6	50,969	204.1
Bihar	130,669	119·8	3,119	120·6
Orissa	52,175	223·5	813	152·8
Bengal	266,226	184·7	14,697	184·3
C. P.	138,992	238·3	18,642	237·5
Bombay	101,307	162·5	30,793	228·0
Sind	5,132	101·9	4,243	157·7
Madras	241,048	165·3	42,882	170·8
Coorg	613	186·4	24	48·4
Assam	38,261	165·9	796	121·7
Ajmer-Merwara	1,954	157·7	2,413	292·2

TABLE O.—THE FOLLOWING ARE THE CHANGES IN, OR ADDITIONS TO, THE LIST OF NOTIFIABLE DISEASES GIVEN ON PAGES 265—274 OF THE ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER FOR THE YEAR 1937.

A.—BRITISH INDIA, PROVINCES.

Delhi Province.—Scarlet fever, influenza, pneumonia and erysipelas were deleted. Relapsing fever, whooping cough, amœbic and bacillary dysentery, mumps, puerperal fever, and leprosy were added. "Enteric fever and its allied fevers" were substituted in the place of "Enteric fever".

Bihar.—Tuberculosis was added.

Assam.—Influenza was added to the list of diseases notifiable in all municipalities.

Typhoid, tuberculosis and diphtheria which in 1937 were notifiable in Shillong Municipality only were included in the list for all municipalities. "Typhoid or enteric fever" was substituted in the place of "Typhoid".

B.—BRITISH INDIA, TOWNS.

Delhi City.—The changes are shown above against Delhi province.

Patna Town.—Tuberculosis was added.

C.—INDIAN STATES.

Hyderabad.—Typhoid and tuberculosis have also been included under the Epidemic Diseases Act which was submitted to Government for sanction.

Gujarat States Agency.—Information regarding the individual States in this Agency was not available for 1937. Complete lists of notifiable diseases for 1938 are given below.

Baria.—Plague, smallpox and cholera.

Chota Udaipur.—Cholera, smallpox, dysentery and diarrhœa, typhoid fever (enteric), influenza, cerebrospinal fever, malaria, rabies, measles, whooping cough and diphtheria.

Cambay.—Smallpox, measles, typhoid fever, dysentery and diarrhœa.

Dharampur.—Cholera, smallpox, influenza and plague.

Lunawada.—Plague, cholera, cerebrospinal fever and meningitis and influenza.

Rajpipla.—Cholera, smallpox, plague, influenza, typhus, relapsing fever and cerebrospinal fever.

Sant.—Plague, cholera, smallpox, dysentery and diarrhœa, typhoid fever, influenza, cerebrospinal fever, malaria, rabies, measles, diphtheria and whooping cough.

Sachin.—Smallpox, chickenpox, measles, cholera, plague, typhoid fever, malaria, influenza, dysentery and diarrhœa, diphtheria and rabies.

Bansda.—Cholera, smallpox, measles, typhoid, plague, tuberculosis and influenza.

Mysore.—Revised and separate lists for Mysore City, Kolar Gold Fields and for Bangalore City are given below:—

Mysore City.—Cholera, smallpox, plague, tuberculosis, rabies, typhoid, para-typhoid, malaria, dysentery, continuous fever of over 7 days' duration and fever with glandular swellings.

Sanitary Board Area Kolar Gold Field.—Cholera, smallpox, plague, tuberculosis, rabies, typhoid and para-typhoid.

Bangalore City.—Cholera, smallpox and plague.

Cochin.—Acute pneumonia, influenza, relapsing fever and rabies were added.

Kapurthala.—Dysentery was added.

Dujana.—Dysentery was added.

Nalagarh.—Dysentery was added.

Terhi Garhwal.—Plague, cerebrospinal fever and diphtheria were deleted. Measles and tuberculosis were added.

Benares.—Cerebrospinal meningitis and tuberculosis were added.

Rampur.—Cerebrospinal fever and measles were deleted.

TABLE P.—CRUDE AND STANDARDISED DEATH RATES *per mille* (DIRECT METHOD) FOR DIFFERENT PROVINCES IN INDIA. THE 1931 CENSUS POPULATION DISTRIBUTION FOR INDIA HAS BEEN TAKEN AS THE STANDARD.

		1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.
BRITISH INDIA	Standardised	24·1	21·0	21·6	22·8	22·1	22·7	22·0	23·7
	Crude	25·2	21·6	22·4	24·9	23·6	23·2	22·4	24·3
N.-W. F. P.	Standardised	20·5	20·3	21·2	20·7	18·8	17·1	20·4	21·8
	Crude	20·2	19·7	20·8	20·4	18·6	17·0	19·9	21·3
Punjab	Standardised	23·4	22·0	24·5	24·6	21·1	20·5	19·2	20·8
	Crude	25·9	24·2	27·1	26·3	23·3	22·0	23·1	23·4
Delhi	Standardised	23·4	23·9	31·8	30·6	28·9	25·6	23·4	22·8
	Crude	23·7	24·2	31·9	28·5	28·7	23·8	23·8	23·4
U. P.	Standardised	26·1	21·4	17·2	25·7	23·1	21·2	19·4	23·2
	Crude	26·9	22·0	18·2	25·6	23·6	21·2	19·8	23·6
Bihar	Standardised	26·0†	19·9†	20·9†	26·2†	23·6†	21·3	20·7	21·4
	Crude	26·5†	20·4†	21·6†	25·1†	24·1†	20·5	21·0	21·8
Orissa	Standardised	..	..	..	..	..	28·2	27·0	28·5
	Crude	..	..	..	..	..	27·0	27·6	28·8
Bengal	Standardised	23·5	21·8	25·0	23·5	22·7	24·0	24·0	26·3
	Crude	22·2	20·3	23·7	23·2	22·1	23·7	23·6	25·0
C. P.	Standardised	31·8	23·5	23·0	*	*	31·1	28·4	35·2
	Crude	35·4	26·5	25·7	35·5	32·6	32·4	30·1	37.6
Bombay	Standardised	23·5‡	22·4‡	23·9‡	20·9‡	24·2‡	26·6	24·8	27·1
	Crude	23·7‡	22·7‡	24·1‡	24·5‡	24·4‡	26·0	25·4	27·9
Sind	Standardised	..	..	..	..	..	12·3	13·0	13·2
	Crude	..	..	..	..	..	11·5	11·1	11·3
Madras	Standardised	21·3	19·8	21·3	24·3	22·3	22·1	20·9	20·8
	Crude	23·6	21·6	22·9	23·9	23·6	22·0	22·3	21·6

Coorg	Standardised	25·7	24·9	26·5	25·0	24·6	25·6	29·8	26·6
	Crude	23·8	23·3	24·0	23·1	22·9	23·7	27·2	24·3
Assam	Standardised	19·7	19·4	20·6	19·6	21·4	19·5	21·8	22·1
	Crude	18·6	18·7	19·8	19·0	20·5	18·6	20·9	20·9
Ajmer-Merwara	Standardised	30·0	24·5	27·4	28·9	27·8	24·2	29·3	25·0
	Crude	30·1	24·8	28·1	28·7	28·4	24·1	29·8	25·1

* Figures not available.
† Including Orissa.
‡ Including Sind.

TABLE Q*.—ESTIMATED POPULATION OF ASSAM BY AGE AND SEX.

	1931.		1932.		1933.		1934.		1935.		1936.		1937.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
0—1 year	132,224	132,920	133,409	134,300	134,971	136,017	136,202	137,386	137,453	138,796	138,722	140,184	140,034	141,605
1—5 years	542,680	557,747	547,544	563,541	553,951	570,745	559,004	576,487	564,138	582,407	569,348	588,228	574,733	594,192
5—10 years	567,065	511,593	572,148	516,907	578,848	523,514	584,123	528,781	589,488	534,211	594,932	539,551	600,560	545,021
10—15 years	482,045	428,410	486,365	432,860	492,057	438,393	496,545	442,804	501,105	447,351	505,733	451,822	510,517	456,403
15—20 years	346,103	382,057	349,205	386,026	353,292	390,960	356,514	394,894	359,789	398,949	363,111	402,937	366,546	407,022
20—30 years	745,506	721,987	752,188	729,486	760,991	738,811	767,932	746,245	774,985	753,908	782,141	761,443	789,540	769,163
30—40 years	627,030	473,024	632,650	477,937	640,054	484,047	645,892	488,917	651,824	493,937	657,843	498,874	664,066	503,932
40—50 years	397,377	278,989	400,939	281,886	405,631	285,490	409,331	288,362	413,090	291,323	416,905	294,235	420,849	297,218
50—60 years	216,334	158,006	218,273	159,647	220,828	161,688	222,842	163,315	224,889	164,992	226,965	166,641	229,112	168,330
60 years and over.	138,605	105,705	139,847	106,803	141,483	108,169	142,774	109,257	144,085	110,379	145,416	111,482	146,791	112,612

*Please see the remarks on page 191 in respect of this table.

TABLE R.*—DEATH RATES ACCORDING TO AGE AND SEX IN ASSAM.

	1931.		1932.		1933.		1934.		1935.		1936.		1937.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
0—1 years	160·4	144·8	166·0	146·5	173·0	154·0	174·0	156·0	170·0	156·0	158·5	142·6	166·5	153·2
1—5 years	20·6	18·9	20·8	20·0	21·6	20·2	21·3	19·7	26·2	25·6	22·5	20·9	24·0	22·1
5—10 years	9·3	8·7	10·6	10·2	10·9	10·5	9·5	9·2	11·5	11·2	9·7	9·4	11·1	10·7
10—15 years	6·0	5·7	6·0	5·7	6·3	5·8	5·8	5·5	6·5	6·2	6·3	5·4	7·2	7·2
15—20 years	8·1	11·1	8·0	11·1	9·0	11·8	7·8	11·1	8·9	10·7	8·3	10·6	10·4	12·2
20—30 years	8·7	13·8	8·1	13·3	8·7	13·9	6·2	13·1	8·6	13·6	8·1	12·6	9·3	15·0
30—40 years	12·2	15·0	11·1	13·5	11·7	14·6	11·7	13·4	11·7	14·8	10·0	14·1	12·2	16·1
40—50 years	18·0	16·4	17·3	16·2	18·2	17·1	17·2	16·3	17·4	17·4	16·9	16·5	18·5	10·3
50—60 years	31·1	28·2	29·3	27·7	30·9	28·7	30·0	27·9	30·1	29·6	30·0	28·3	32·1	33·5
60 years and over	67·2	63·6	61·6	59·4	68·8	66·8	67·0	63·2	74·3	73·3	66·7	65·4	75·0	75·4

Please see the remarks on page 191 in respect of this table.

Appendix II

relating to

Section II-Chief diseases

TABLE A.—DEATHS AND RATES *PER MILLE* FROM CERTAIN CAUSES OR GROUPS OF CAUSES OF MORTALITY.

Province.	Cholera.		Smallpox.		Plague.		Fevers.		Dysentery and Diarrhœa.		Respiratory Diseases.		Other causes.		Total.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA .	236,143	0·9	39,844	0·1	17,371	0·06	3,833,627	14·1	292,482	1·1	536,649	1·9	1,679,004	6·1	6,685,120	24·3
N-W. F. P. .	740	0·3	1,065	0·4	...	...	41,622	16·4	456	0·2	3,704	1·5	6,395	2·5	53,982	21·3
Punjab . .	5,760	0·2	5,455	0·2	1	0·00	410,198	15·4	12,046	0·5	77,668	2·9	111,571	4·2	622,699	23·4
Delhi . .	182	0·3	90	0·1	...	...	4,856	6·8	966	1·4	5,763	8 1	4,875	6·7	16,732	23·4
U. P. . .	70,622	1·3	4,411	0·1	13,436	0·3	940,469	17·7	21,015	0·4	46,957	0·9	153,078	2·9	1,249,988	23·6
Bihar .	14,750	0·4	5,977	0·2	1,838	0·1	615,966	17·6	3,726	0·1	3,040	0·1	118,436	3·3	763,733	21·8
Orissa . .	1,309	0·2	3,350	0·5	...	...	113,610	15·7	19,816	2·7	4,967	0·7	65,534	9·0	208,586	28·8
Bengal . .	71,133	1·4	9,289	0·2	...	...	819,763	15·6	69,232	1·3	99,763	1·9	246,706	4 6	1,315,886	25·0
C. P. . . .	45,332	2·7	409	0·02	535	0·03	322,404	19·2	42,793	2·6	54,137	3·2	163,691	9·8	629,301	37·6
Bombay . .	3,813	0·2	4,355	0·2	406	0·02	186,363	9·5	34,242	1·7	125,618	6·4	192,590	9·9	547,387	27·9
Sind . . .	343	0·1	941	0·2	...	...	27,970	6·6	1,316	0·3	8,759	2·1	8,756	2·0	48,085	11·3
Madras . .	10,252	0·2	2,273	0·05	1,155	0·02	282,708	5·9	74,064	1·5	96,420	2·0	565,180	11·9	1,032,052	21·6
Coorg. . .	...	...	8	0·02	...	...	3,027	18·4	128	0·8	251	1·5	577	3·6	3,986	24·3
Assam . .	11,907	1·4	1,649	0·2	...	...	105,687	12·4	11,925	1·4	6,874	0·8	39,725	4·7	177,767	20·9
Ajmer-Merwara .	...	...	577	1·0	...	...	8,984	15·1	757	1·3	2,728	4·6	1,890	3·1	14,936	25.1

TABLE B.—DEATHS AND RATES *PER MILLE* FROM CERTAIN CAUSES OR GROUPS OF CAUSES OF MORTALITY IN RURAL AND URBAN AREAS.

Province.	Cholera.				Smallpox.				Plague.			
	Rural.		Urban.		Rural.		Urban.		Rural.		Urban.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA	222,489	0·9	13,654	0·5	30,704	0·1	9,140	0·3	15,887	0·1	1,484	0·1
N.-W. F. P.	617	0·3	123	0·4	920	0·4	145	0·4	...	...	...	...
Punjab	4,914	0·2	846	0·2	4,044	0·2	811	0·2	1	0·00	...	...
Delhi	67	0·3	115	0·2	4	0·02	86	0·2	...	...	...	...
U. P.	66,667	1·4	3,955	0·7	3,244	0·1	1,167	0·2	12,332	0·3	1,104	0·2
Bihar	14,423	0·4	327	0·2	5,493	0·2	484	0·3	1,740	0·1	98	0·1
Orissa	1,272	0·2	37	0·2	3,321	0·5	29	0·1	...	...	...	...
Bengal	67,771	1·4	3,362	1·0	6,635	0·1	2,654	0·3	...	...	...	...
C. P.	41,717	2·8	3,615	2·0	210	0·01	199	0·1	477	0·03	58	0·03
Bombay	3,710	0·2	103	0·03	2,086	0·1	2,269	0·6	342	0·02	64	0·02
Sind	312	0·1	31	0·04	871	0·2	70	0·1	...	...	...	...
Madras	9,251	0·2	1,001	0·3	1,407	0·03	866	0·2	995	0·02	160	0·04
Coorg	...	...	...	...	8	0·02	...	...	...	...	...	...
Assam	11,768	1·4	139	0·7	1,641	0·2	8	0·04	...	...	...	...
Ajmer-Merwara	...	...	...	...	225	0·5	352	1·9	...	...	...	...

TABLE B.—DEATHS AND RATES *PER MILLE* FROM CERTAIN CAUSES OR GROUPS OF CAUSES OF MORTALITY IN RURAL AND URBAN AREAS—*contd.*

Province.	Fevers.				Dysentery and Diarrhœa.				Respiratory diseases.			
	Rural.		Urban.		Rural.		Urban.		Rural.		Urban.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA	3,680,188	14·8	203,439	7·7	230,240	0·9	62,242	2·4	372,324	1·5	164,325	6·3
N.-W. F. P.	38,903	17·7	2,719	8·0	251	0·1	205	0·6	2,083	0·9	1,621	4·7
Punjab	379,310	16·4	30,888	8·9	7,705	0·3	4,341	1·2	61,259	2·7	16,409	4·7
Delhi	3,742	17·0	1,114	2·2	203	0·9	768	1·5	1,277	5·8	4,486	9·1
U. P.	871,789	18·5	68,680	11·5	6,847	0·1	14,168	2·4	9,739	0·2	37,218	6·3
Bihar	607,184	18·0	8,782	6·2	2,744	0·1	982	0·7	2,351	0·1	689	0·5
Orissa	112,229	16·0	1,381	6·1	19,125	2·7	691	3·1	4,634	0·7	333	1·5
Bengal	804,016	16·4	15,747	4·5	59,694	1·2	9,538	2·7	80,970	1·7	18,793	5·3
C. P.	300,386	20·2	22,018	11·9	36,739	2·5	6,054	3·3	44,055	3·0	10,082	5·5
Bombay	164,741	10·4	21,622	5·8	26,772	1·7	7,470	2·0	87,588	5·5	38,030	10·2
Sind	25,157	7·2	2,813	3·7	169	0·05	1,147	1·5	3,886	1·1	4,873	6·4
Madras	257,300	5·9	25,408	6·4	58,479	1·3	15,585	3·9	67,956	1·5	28,464	7·2
Coorg	2,988	19·3	39	4·2	117	0·8	11	1·2	138	0·9	113	12·0
Assam	104,685	12·6	1,002	4·7	11,391	1·4	534	2·5	6,379	0·8	495	2·3
Ajmer-Merwa	7,758	18·9	1,226	6·6	4	0·01	753	4·1	9	0·02	2,719	14·7

Table C.—Deaths from Cholera from 1905 to 1938.

Year.	British India.	N.-W. F. P.	Punjab.	Delhi.	U. P.	Bihar.	Orissa.	Bengal.	C. P.	Bombay.	Sind.	Madras.	Coorg.	Assam.	Burma.	Ajmer-Merwara.	Indian States. Rajputana.	Central India.	Hyderabad.	Mysore.
1905—1909.	2,371,365	3,545	20,354	324	399,144	555,350	...	677,816	61,011	89,644	...	422,658	410	95,927	44,897	285	5,926	13,366	2,227	16,600
1910—1914.	1,767,770	5,421	17,643	503	331,970	394,482	...	451,025	78,258	96,929	...	289,444	254	81,967	19,800	74	6,219	25,896	9,210	17,672
1915—1919.	2,098,749	5,557	25,030	242	346,359	598,862	...	453,864	110,998	97,606	...	321,297	191	99,088	38,713	942	7,970	15,652	26,647	13,062
1920—1924.	1,069,136	4,390	22,843	781	228,540	229,512	...	276,455	72,680	25,793	...	131,845	34	54,379	21,805	79	3,911	6,826	9,254	8,023
1925	115,645	116	3,049	50	7,653	17,336	...	34,276	124	57	...	44,815	4	6,233	1,932	...	...	43	22	...
1926	138,151	...	87	18	6,166	27,268	...	59,106	4,565	73	...	24,407	2	10,275	6,182	2	4	269	26	6
1927	304,710	2	11,286	16	28,285	49,022	...	118,377	16,311	26,153	...	35,334	...	15,392	4,528	4	1,357	2,584	8,913	1,367
1928	351,305	...	2,034	34	44,941	77,103	...	136,245	12,198	6,881	...	57,677	...	6,915	7,209	68	1,371	7,520	4,314	413
1929	295,434	30	2,309	193	50,924	104,034	...	81,090	6,168	9,084	...	25,846	1	7,765	7,970	20	722	1,155	450	140
1930	337,322	449	1,181	8	61,334	155,215	...	54,963	23,250	15,142	...	18,746	...	6,332	661	41	2,101	11,165	18,369	535
1931	220,909	105	391	61	31,118	40,943	...	79,073	14,135	18,646	..	30,232	116	5,523	534	32	294	1,411	5,653	6,385
1932	67,219	70	614	4	9,734	9,348	...	33,910	854	1,353	...	5,278	...	4,971	1,082	1	122	168	71	83
1933	68,318	...	160	...	1,915	17,514	...	29,242	2,152	7,797	...	3,851	...	5,508	179	...	35	642	4,838	90
1934	199,708	...	178	19	31,903	57,289	...	50,742	27,329	11,362	...	18,158	1	1,904	822	1	969	4,471	4,051	346
1935	217,162	245	714	181	10,412	64,876	...	59,605	20,140	11,235	...	35,456	...	7,136	6,858	4	33	1,043	10,553	1,407
1936	159,720	68	1,762	48	6,793	6,070	7,977	76,100	10,691	11,304	8	34,117	2	3,816	984	21	776	604	9,065	1,793
1937	*99,054	24	105	...	6,341	13,949	5,076	32,710	1,107	10,992	2	23,307	1	5,440	†	...	..	1,042	2,351	4,842
1938	*236,143	740	5,760	132	70,622	14,750	1,309	71,133	45,332	3,813	343	10,252	...	11,907	†	...	2,070	11,702	8,687	880

*Excluding Burma.

†Burma was separated from India since April 1937.

Table D.—Deaths and rates *per mille* from Cholera in rural and urban areas.

	Deaths.			Rate p. m.			No. of anti-cholera inoculations.	Total villages.	Number infected.
	R.	U.	Total.	R.	U.	Total.			
British India	222,489	13,654	236,143	0·9	0·5	0·9	10,779,332	451,210	44,259
N.-W. F. P.	617	123	740	0·3	0·4	0·3	234,185	2,802	157
Punjab	4,914	846	5,760	0·2	0·2	0·2	666,652	34,875	1,422
Delhi	67	115	182	0·3	0·2	0·3	93,213	309	24
U. P.	66,667	3,955	70,622	1·4	0·7	1·3	1,544,041	105,640	9,493
Bihar	14,423	327	14,750	0·4	0·2	0·4	593,375	67,879	3,278
Orissa	1,272	37	1,309	0·2	0·2	0·2	132,260	19,466	445
Bengal	67,771	3,362	71,133	1·4	1·0	1·4	3,353,053	86,361	17,753
C. P.	41,717	3,615	45,332	2·8	2·0	2·7	1,887,632	39,246	5,969
Bombay	3,710	103	3,813	0·2	0·03	0·2	328,579	21,455	812
Sind	312	31	343	0·1	0·04	0·1	27,434	9,095	70
Madras	9,251	1,001	10,252	0·2	0·3	0·2	951,079	34,880	2,212
Coorg	...	...	...	··	...	...	...	298	...
Assam	11,768	139	11,907	1·4	0·7	1·4	972,696	28,333	2,629
Ajmer-Merwara	...	...	...	··	...	...	133	621	...

R.—Rural. U.—Urban.

Table E.—Deaths from Cholera by months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	5,486	5,573	10,268	13,021	27,763	32,192	27,225	29,457	22,270	20,287	23,527	19,074
N.-W. F. P.	...	...	...	1	123	242	152	171	45	6	...	...
Punjab	...	...	...	337	2,378	2,131	712	167	35	...	...	...
Delhi	...	...	1	17	91	40	32	1	...	...	...	...
U. P.	128	55	291	2,063	14,103	21,013	11,987	7,240	4,057	4,694	3,457	1,534
Bihar	168	492	260	432	578	1,107	2,133	2,246	2,630	1,626	2,386	1,292
Orissa	91	93	194	155	276	291	118	65	5	5	...	9
Bengal	2,615	3,707	8,435	6,699	3,821	2,122	1,348	1,214	5,561	8,557	14,031	13,023
C. P.	22	23	282	2,096	5,364	3,382	8,066	15,596	7,723	2,263	471	94
Bombay	15	6	60	10	34	143	350	1,013	728	823	474	157
Sind	...	...	...	1	71	127	112	32	...	...	...	...
Madras	2,256	1,034	428	740	458	714	1,509	1,097	959	663	148	246
Coorg	...	...	...	...	...	...	...	...	...	...	...	...
Assam	191	163	317	470	466	930	708	615	1,127	1,650	2,553	2,719
Ajmer-Merwara	...	...	...	...	...	...	...	...	...	...	...	...

TABLE F.—DEATHS FROM PLAGUE BY MONTHS.

(i) British Provinces.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.	No. of anti-plague inoculations.
GRAND TOTAL .	3,528	3,314	4,915	3,957	1,001	261	639	1,276	1,378	1,548	1,405	1,955	25,177	...	...
BRITISH INDIA .	2,546	2,530	4,223	3,676	925	192	283	507	410	370	510	1,199	17,371	0·06	420,662
N.-W. F. P. . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Punjab . . .	...	...	1	...	...	...	...	...	...	...	...	...	1	0·00	352
Delhi . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
U. P. . . .	2,020	1,903	3,418	3,228	847	139	142	257	173	117	261	931	13,436	0·3	163,944
Bihar . . .	252	342	572	349	49	12	43	71	35	7	24	82	1,838	0·1	34,972
Orissa . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
C. P. . . .	75	92	106	38	2	...	3	33	40	39	57	50	535	0·03	19,485
Bombay . . .	14	30	39	20	6	12	16	37	49	52	75	56	406	0·02	41,560
Sind . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Madras . . .	185	163	87	41	21	29	79	109	113	155	93	80	1,155	0·02	159,510
Coorg . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	839
Assam . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ajmer-Merwara .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

(ii) Indian States* and Agencies.

Kolhapur State .	66	43	40	19	...	....	24	39	15	35	34	7	322
Kurundwad Jr. State (Deccan States).	...	...	...	...	...	...	...	...	...	...	1	3	4
Sangli State (Deccan States).	...	...	...	...	...	...	...	1	...	...	4	8	13
Benares State .	36	89	224	95	9	...	...	...	2	...	12	42	509
Mysore State . .	817	576	362	156	67	69	304	598	720	651	476	400	5,196
C. & M. Station, Bangalore . .	...	3	1	...	...	...	...	2	5	...	...	...	11
Hyderabad State .	63	73	65	11	...	...	28	129	226	491	367	296	1,749
Cochin State (Madras Presidency).	...	...	...	...	...	...	...	...	...	1	1	...	2

* Among the Indian States from which plague returns have been received, only those states in which at least one death from plague was reported have been included in the above table.

TABLE G.—DEATHS AND RATES *per mille* FROM SMALLPOX IN RURAL AND URBAN AREAS.

	Deaths.			Death rate p. m.			Deaths in children.			Percentages of deaths to total mortality from smallpox.	
	R.	U.	Total.	R.	U.	Total.	Under 1 year.	1—10 years.	Total.	Under 1 year.	1—10 years.
BRITISH INDIA	30,704	9,140	39,844	0·1	0·3	0·1	6,165†	10,837†	17,002†	15·7†	27·6†
N.-W. F. P.	920	145	1,065	0·4	0·4	0·4	269	609	878	25·3	57·2
Punjab	4,644	811	5,455	0·2	0·2	0·2	1,531	2,737	4,268	28·1	50·2
Delhi	4	86	90	0·02	0·2	0·1	26	56	82	28·9	62·2
U. P.	3,244	1,167	4,411	0·1	0·2	0·1	1,202	1,645	2,847	27·1	37·3
Bihar	5,493	484	5,977	0·2	0·3	0·2	311	680	991	5·2	11·4
Orissa	3,321	29	3,350	0·5	0·1	0·5	188	569	757	5·6	17·0
Bengal	6,635	2,654	9,289	0·1	0·8	0·2	530	1,183	1,713	5·7	12·7
C. P.	210	199	409	0·01	0·1	C·C2	145	203	348	35·5	49·6
Bombay	2,086	2,269	4,355	0·1	0·6	0·2	1,059	1,857	2,916	24·3	42·6
Sind	871	70	941	0·2	0·1	0·2	160	430	590	17·0	45·7
Madras	1,407	866	2,273	0·03	0·2	0·05	596	583	1,179	26·2	25·6
Coorg	3	...	3	0·02	...	0·02	2	1	3	66·7	33·3
Assam	1,641	8	1,649	0·2	0·04	0·2	146	284	430	8·9	17·2
Ajmer-Merwara	225	352	577	0·5	1·9	1·0	*	*	*	*	*

†Excluding Ajmer-Merwara.

*Not available.

R.—Rural.

U.—Urban.

TABLE H.—DEATHS FROM SMALLPOX BY MONTHS.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	4,696	4,446	6,093	6,143	6,105	3,640	2,213	1,397	835	576	1,328	2,372
N.-W. F. P.	234	137	94	63	114	80	53	60	6	17	92	115
Punjab	981	737	641	610	745	562	265	141	65	54	195	459
Delhi	6	8	8	19	19	9	1	1	1	...	3	15
U. P.	379	296	510	688	901	551	258	121	53	31	136	487
Bihar	515	374	567	1,118	1,268	681	395	181	152	70	364	292
Orissa	363	317	535	396	385	299	271	249	184	58	75	218
Bengal	1,068	1,182	2,127	1,696	1,389	668	330	222	125	115	101	266
C. P.	11	34	79	93	72	34	48	14	9	4	2	9
Bombay	473	776	918	717	503	310	213	109	81	60	67	128
Sind	181	87	120	132	125	67	51	66	5	25	46	36
Madras	264	277	273	217	174	150	187	177	108	87	115	244
Coorg	...	...	3	...	...	...	...	...	...	...	...	...
Assam	176	155	87	233	280	199	133	52	46	55	132	101
Ajmer-Merwara	45	66	131	161	130	80	8	4	...	...	...	2

TABLE .—DEATHS AND RATES *per mille* FROM FEVERS AND MALARIA IN RURAL AND URBAN AREAS.

	Fever deaths.			Death rate p. m.			Reported malaria deaths.		
	R.	U.	Total.	R.	U.	Total	R.	U.	Total.
BRITISH INDIA	3,680,188	203,439	3,883,627	14·8	7·7	14·1	1,520,886	56,979	1,577,865
N.-W. F. P.	38,903	2,719	41,622	17·7	8·0	16.4	@	50*	50
Punjab	379,310	30,888	410,198	16·4	8·9	15·4	4,242	773	5,015
Delhi	3,742	1,114	4,856	17·0	2·2	6·8	12	303	315
U. P.	871,789	68,680	940,469	18·5	11·5	17·7	789,909	29,148	819,057
Bihar	607,184	8,782	615,966	18·0	6·2	17·6	@	1,320*	1,320
Orissa	112,229	1,381	113,610	16·0	6·1	15·7	@	489*	489
Bengal	804,016	15,747	819,763	16·4	4·5	15·6	413,557	2,964	416,521
C. P.	300,386	22,018	322,404	20·2	11·9	19·2	285,399	16,851	302,250
Bombay	164,741	21,622	186,363	10·4	5·8	9·5	27,335	2,455	29,790
Sind	25,157	2,813	27,970	7·2	3·7	6·6	432	1,254	1,686
Madras	257,300	25,408	282,708	5·9	6·4	5·9	@	1,190*	1,190
Coorg	2,988	39	3,027	19·3	4·2	18·4	...	...	...
Assam	104,685	1,002	105,687	12·6	4·7	12·4	@	181*	181
Ajmer-Merwara	7,758	1,226	8,984	18·9	6·6	15·1	@	1*	1

@ Not available.
* For Municipalities only.

R.—Rural. U.—Urban.

TABLE J.—DEATHS FROM FEVERS BY MONTHS.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	322,761	263,347	278,583	321,390	355,232	324,773	321,951	324,563	320,317	330,831	357,179	362,700
N.-W. F. P.	4,746	3,603	3,417	3,048	3,931	3,313	3,084	2,687	2,599	3,199	3,236	4,759
Punjab	34,152	27,226	26,937	32,455	53,181	44,958	34,196	30,212	29,031	30,218	32,325	35,307
Delhi	356	246	311	461	765	523	419	362	334	276	349	454
U. P.	77,776	63,675	61,927	86,314	99,247	96,427	83,933	76,654	72,883	70,556	71,785	79,292
Bihar	48,424	37,824	43,176	53,791	54,797	50,570	54,847	57,176	54,173	50,437	57,996	52,815
Orissa	9,869	8,099	9,374	8,296	8,199	7,739	9,750	10,772	9,462	8,772	11,297	11,981
Bengal	76,448	60,693	63,760	52,942	51,905	52,476	57,057	60,188	65,280	79,995	95,332	93,681
C. P.	19,861	18,648	22,627	26,167	32,780	20,877	23,660	30,468	33,539	33,676	32,328	27,773
Bombay	13,174	13,031	14,572	16,336	14,575	13,049	17,306	19,206	18,032	16,151	15,389	15,542
Sind	3,326	2,468	2,620	2,441	2,513	2,098	1,820	1,742	1,847	2,291	2,546	2,258
Madras	24,408	19,331	21,792	20,306	22,780	21,566	25,668	25,679	24,129	25,314	23,709	28,026
Coorg	286	206	253	204	237	334	330	238	240	253	229	217
Assam	8,992	7,421	6,878	7,693	9,340	10,277	9,259	8,408	8,100	9,176	10,177	9,966
Ajmer-Merwara	943	876	939	930	982	566	622	771	668	517	541	629

TABLE K.—DEATHS AND RATES *per mille* FROM DYSENTERY AND DIARRHŒA IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate *per mille*		
	R.	U.	Total.	M.	F.	R.	U.	Total.
BRITISH INDIA	230,240	62,242	292,482	152,239	140,243	0·9	2·4	1·1
N.-W. F. P.	251	205	456	270	186	0·1	0·6	0·2
Punjab	7,705	4,341	12,046	6,540	5,506	0·3	1·2	0·5
Delhi	203	763	966	479	487	0·9	1·5	1·4
U. P.	6,847	14,168	21,015	11,072	9,943	0·1	2·4	0·4
Bihar	2,744	982	3,726	2,190	1,536	0·1	0·7	0·1
Orissa	19,125	691	19,816	10,340	9,476	2·7	3·1	2·7
Bengal	59,694	9,538	69,232	36,126	33,106	1·2	2·7	1·3
C. P.	36,739	6,054	42,793	22,069	20,724	2·5	3·3	2·6
Bombay	26,772	7,470	34,242	17,660	16,582	1·7	2·0	1·7
Sind	169	1,147	1,316	740	576	0·05	1·5	0·3
Madras	58,479	15,585	74,064	37,988	36,076	1·3	3·9	1·5
Coorg	117	11	128	66	62	0·8	1·2	0·8
Assam	11,391	534	11,925	6,321	5,604	1·4	2·5	1·4
Ajmer-Merwara	4	753	757	378	379	0·01	4·1	1·3

R—Rural U—Urban. M—Males. F—Females.

TABLE L.—DEATHS FROM DYSENTERY AND DIARRHŒA BY MONTHS.

	Jan.	Feb.	Mar.	April	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec
BRITISH INDIA	19,938	16,058	18,303	20,300	21,599	22,821	30,509	34,445	30,508	27,733	25,892	24,376
N.-W. F. P.	27	14	22	42	59	52	58	49	53	33	18	29
Punjab	466	337	449	923	2,063	1,675	1,241	1,219	1,087	1,001	914	671
Delhi	23	36	48	92	218	119	124	116	49	54	46	41
U. P.	955	678	1,207	2,182	2,512	2,590	2,401	2,586	1,899	1,616	1,292	1,097
Bihar	219	160	193	258	276	304	754	518	304	251	252	237
Orissa	1,536	1,356	1,525	1,367	1,278	1,803	2,382	2,343	1,735	1,458	1,435	1,598
Bengal	5,412	4,580	5,658	5,895	4,668	4,532	4,929	4,883	5,476	6,870	8,355	7,974
C. P.	1,820	1,566	1,761	2,025	1,900	2,103	4,342	7,300	7,159	5,526	4,178	3,113
Bombay	1,528	1,337	1,423	1,701	1,849	2,551	5,198	6,315	4,612	3,203	2,359	2,166
Sind	103	85	99	83	118	144	107	139	166	106	95	71
Madras	7,025	5,260	5,223	4,878	5,483	5,640	7,860	7,947	7,001	6,370	5,487	5,890
Coorg	...	8	11	14	12	16	13	10	13	12	6	13
Assam	793	612	600	729	1,013	1,238	,040	927	889	1,208	1,434	1,442
Ajmer-Merwara	31	29	84	111	150	54	60—	93	85	25	21	34

TABLE M.— DEATHS AND RATES *per mille* FROM RESPIRATORY DISEASES IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate *per mille*.					Reported deaths from pulmonary tuberculosis.	
	R.	U.	Total.	M.	F.	R.	U.	Total.	M.	F.	R.	U.
BRITISH INDIA	372,324	164,325	536,649	304,206	232,443	1·5	6·3	1·9	2·1	1·7	* 40,958	31,085
N.-W. F. P.	2,083	1,621	3,704	2,128	1,576	0·9	4·7	1·5	1·5	1·4	†	364*
Punjab	61,259	16,409	77,668	43,510	34,158	2·7	4·7	2·9	3·0	2·8	10,379	2,822
Delhi	1,277	4,486	5,763	3,007	2,756	5·8	9·1	8·1	7·3	9·1	131	926
U. P.	9,739	37,218	46,957	25,050	21,907	0·2	6·3	0·9	0·9	0·9	876	5,450
Bihar	2,351	689	3,040	1,764	1,276	0·1	0·5	0.1	0.1	0.1	†	141*
Orissa	4,634	333	4,967	2,851	2,116	0·7	1·5	0·7	0·8	0·6	†	5*
Bengal	80,970	18,793	99,763	62,912	36,851	1·7	5·3	1·9	2·3	1·5	10,076	4,592
C. P.	44,055	10,082	54,137	31,207	22,930	3·0	5·5	3·2	3·7	2·7	1,238	426
Bombay	87,588	38,030	125,618	67,883	57,735	5·5	10·2	6·4	6·7	6·1	17,780	7,785
Sind	3,886	4,873	8,759	5,251	3,508	1·1	6·4	2·1	2·2	1·9	478	1,018
Madras	67,956	28,464	96,420	53,020	43,400	1·5	7·2	2·0	2·2	1·8	†	6,929*
Coorg	138	113	251	176	75	0·9	12·0	1·5	1·9	1·0	..	...
Assam	6,379	495	6,874	4,048	2,826	0·8	2·3	0·8	0·9	0·7	†	66*
Ajmer-Merwara	9	2,719	2,728	1,399	1,329	0·02	14·7	4·6	4·4	4·8	†	561*

* For municipalities only. †Not available.

R.—Rural. U.—Urban. M.—Male. F.—Female.

TABLE N.—DEATHS FROM RESPIRATORY DISEASES BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	50,566	44,769	47,089	45,298	43,445	38,095	40,211	42,297	42,387	42,863	46,877	52,752
N.-W. F. P.	648	446	336	265	290	250	214	189	107	174	254	531
Punjab	9,188	7,209	6,181	6,026	7,125	6,022	5,141	4,544	4,630	4,846	6,691	10,065
Delhi	586	453	505	455	603	410	333	342	394	380	519	783
U. P.	5,029	3,938	4,351	4,659	4,831	3,524	3,202	3,257	3,209	3,165	3,457	4,335
Bihar	317	260	242	325	251	243	210	246	240	185	222	299
Orissa	425	396	415	406	395	424	455	442	307	381	406	425
Bengal	10,146	9,178	9,606	8,475	7,480	6,444	6,562	6,545	7,137	8,150	9,713	10,327
C. P.	3,443	3,606	4,145	4,536	4,322	3,244	4,191	5,655	5,834	5,120	5,299	4,742
Bombay	9,725	10,280	11,800	11,493	9,217	8,625	10,458	11,429	11,014	10,477	10,412	10,688
Sind	1,454	1,229	994	665	526	497	427	444	444	487	663	929
Madras	8,674	7,007	7,615	6,995	7,497	7,676	8,354	8,553	8,264	8,630	8,422	8,733
Coorg	26	12	26	29	19	22	19	28	28	17	14	11
Assam	708	549	630	586	549	572	471	430	486	674	604	615
Ajmer-Merwara	197	206	243	383	340	142	174	193	203	177	201	269

TABLE O.—QUININE AND CINCHONA FEBRIFUGE ISSUED BY THE PUBLIC HEALTH, MEDICAL, AND OTHER DEPARTMENTS IN THE VARIOUS PROVINCES OF BRITISH INDIA DURING 1938.

	Quinine.		Cinchona febrifuge.	
	Total issues in lbs.	Grains per head of population.	Total issues in lbs.	Grains per head of population.
British India	83,984	2·1	23,938	0·6
N.-W. F. P.	1,373	3·8	769	2·1
Punjab	2,302	0·6	407	0·1
Delhi	217	2·1	108	1·1
U. P.	5,164	0·7	3,608	0·5
Bihar	3,665	0·7	*Nil*	..
Orissa	1,425	1·4	565	0·5
Bengal	46,461	6·2	14,507	1·9
C. P.	3,802	1·6	899	0·4
Bombay	6,265	2·2	448	0·2
Sind	2,672	4·4	184	0·3
Madras	5,591	0·8	642	0·1
Coorg	842	35·9	390	16·6
Assam	4,111	3·4	1,334	1·1
Ajmer-Merwara	94	1·1	77	0·9

Appendix III

relating to

Section III

TABLE A.—MATERNAL DEATH RATES PER 1,000 OF LIVE AND STILL BIRTHS FOR CERTAIN TOWNS IN BRITISH INDIA.

	1938.	
	Deaths.	Rate. p.m.
North-West Frontier Province.		
Peshawar	47	14·6
Dera Ismail Khan	7	4·4
Punjab.		
Bhiwani	6	3·2
Rohtak	2	1·3
Panipat	13	7·9
Ambala	10	6·8
Jullundur	14	3·3
Ludhiana	10	2·8
Ferozepore	5	2·9
Lahore	119	7·2
Kasur	16	7·6
Amritsar	103	9·5
Batala	1	0·5
Sialkot	10	2·3
Gujranwala	6	2·8
Rawalpindi	19	5·3
Lyallpur	16	6·8
Jhang Maghiana	13	7·1
Multan	58	10·4
Delhi Province.		
Delhi City	122	6·7
New Delhi	17	6·3
United Provinces.		
Lucknow	78	5·6
Cawnpore	116	8·7
Agra	57	4·0
Benares	157	13·7
Allahabad	64	8·4
Bareilly	32	4·7
Moradabad	56	8·8
Meerut	62	12·9
Koil (Aligarh)	38	8·5
Shahjahanpur	35	11·4
Saharanpur	53	12·2
Jhansi	24	5·8
Mirzapur-Bindhachal	12	4·2
Muttra	17	4·7
Fyzabad-Ajodhya	24	15·4
Gorakhpur	27	10·3
Farrukhabad-*cum*-Fatehgarh	37	13·8

	1938.	
	Deaths.	Rate. p.m.
United Provinces—contd.		
Etawah	25	9·4
Budaun	15	7·2
Amroha	17	6·3
Sambhal	13	5·1
Dehra Dun	22	10·8
Hathras	24	9·4
Jaunpur	3	2·2
Pilibhit	14	6·8
Muzaffarnagar	7	4·3
Bahraich	11	7·5
Hardwar Union	31	23·9
Khurja	12	7·0
Bihar.		
Patna	..	..
Bihar	..	..
Gaya	21	7·5
Arrah	..	..
Chapra	5	3·6
Muzaffarpur	14	16·7
Darbhanga	1	0·6
Monghyr	10	7·6
Jamalpur	6	5·8
Bhagalpur	..	..
Ranchi	..	..
Jamshedpur	..	..
Orissa.		
Berhampur	10	6·1
Cuttack	2	2·2
Puri	7	7·1
Bengal Presidency.		
Calcutta	66	2·1
Howrah	51	7·7
Dacca	63	10·9
Bhatpara	22	11·6
Garden Reach	21	19·4
Chittagong	27	17·4
Titagarh	6	7·1
Burdwan	13	12·7
South Suburban	9	10·2
Serampur	5	5·9
Baranagar	9	9·7
Barisal	11	13·8

TABLE A.—*contd.*

	1938. Deaths.	Rate. p. m.
***Bengal Presidency*—contd.**		
Narayanganj	11	9·3
Hooghly-Chinsura	9	7·7
Sirajganj	18	34·0
Midnapur	20	29·0
Bankura	7	16·1
Comilla	7	28·2
Asansol	10	10·4
Naihati	1	2·6
Mymensingh	4	18·8
Kamarhati	8	15·9
Bally	7	13·8
Central Provinces.		
Nagpur City, Nagpur Civil Station	22	1·9
Jubbulpore	36	5·6
Saugor	24	10·0
Khandwa	24	13·8
Burhanpur	45	19·0
Raipur	22	11·4
Amraoti	65	23·3
Akola	16	6·4
Bombay Presidency.		
Bombay City	185	4·7
Ahmedabad	151	7·9
Surat	44	6·6
Broach	43	18·2
Nadiad	10	5·3
Godhra	..	..
Jalgaon	24	14·7
Dhulia	3	2·2
Ahmednagar	22	8·9
Poona	39	4·8
Nasik	25	19·5
Malegaon	1	0·8
Bandra	..	..
Kurla	1	1·2
Belgaum	12	8·2
Dharwar	20	14·7
Hubli	55	20·7
Gadag-Betigeri	23	11·0
Bijapur	13	8·3
Sholapur	70	8·9

	1938. Deaths.	Rate. p.m.
Sind.		
Karachi	84	5·8
Hyderabad	42	10·3
Sukkur	23	8·8
Shikarpur	39	16·8
Madras Presidency.		
Bellary	34	14·9
Adoni	10	6·1
Conjeeveram	57	19·8
Saidapet	9	7·1
Sembiem	6	6·6
Coimbatore	53	11·5
Erode	13	11·0
Cocanada	25	11·9
Rajahmundry	31	13·2
Ellore	28	11·4
Guntur	80	19·9
Tenali	9	6·4
Bezwada	28	10·5
Masulipatam	32	12·2
Kurnool	26	14·6
Madras	284	8·8
Madura	136	14·2
Dindigul	24	11·1
Calicut	48	12·3
Palghat	18	8·5
Cannanore	12	12·2
Tellicherry	16	16·0
Nellore	57	20·9
Vellore	50	14·5
Virudhunagar	21	14·8
Srivilliputtur	14	11·8
Rajapalaiyam	28	17·1
Aruppukottai	9	8·3
Salem	46	10·8
Cuddalore	32	13·2
Mangalore	35	13·6
Tanjore	66	24·1
Kumbakonam	36	12·9
Negapatam	38	20·8
Mayavaram	16	14·8
Tuticorin	35	15·8
Tinnevelly	22	10·1
Trichinopoly	79	14·0
Vizagapatam	14	6·1
Vizianagram	14	7·5
Ajmer-Merwara.		
Ajmer	54	8·9

TABLE B.—MATERNITY AND CHILD WELFARE CENTRES IN RURAL AND URBAN AREAS.

	Centres maintained by								Trained visitors.		Trained midwives.		Trained *dais*.	
	Govt.		Local and Municipal bodies.		Other Agencies.		Total.							
	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.
British India	18	13	362	349	62	189	442	551	69	252	1,335	1,308	3,540	2,438
N.-W. F. P.	..	2	..	..	..	1	..	3	..	5	..	5	34	6
Punjab	1	1	20	21	8	40	29	62	30	63	5	15	479	1,023
Delhi	4	..	4	20	2	2	10	22	8	26	19	22	9	43
U. P.	..	..	147	154	..	..	147	154	..	19	144	188	45	51
Bihar	..	6	..	7	4	6	4	19	..	7	34	46	26	49
Orissa	..	..	2	4	1	2	3	6	..	2	13	10	9	7
Bengal	8	..	7	23	5	..	20	23	3	10	22	61	2,795	714
C. P.	..	..	..	7	19	49	19	56	19	56	1	..	36	423
Bombay	1	1	25	13	9	46	35	60	1	20	45	184	56	75
Sind	..	..	31	9	5	11	36	20	..	6	7	31	45	38
Madras	4	..	122	78	9	20	135	98	8	34	1,041	726	..	..
Coorg	..	..	..	..	..	..	..	..	..	..	..	..	3	..
Assam	..	3	4	13	..	9	4	25	..	3	4	19	3	7
Ajmer-Merwara	..	..	..	..	..	3	..	3	..	1	..	1	..	2

R.—Rural. U.—Urban.

Appendix IV

relating to

Section IV

TABLE A.—EXPENDITURE ON PUBLIC HEALTH DURING 1938-39.

	Total.	Public Health establishment.	Grants for public health purposes.	Expenditure for rural water supply.	Expenses in connection with epidemic diseases.	Bacteriological laboratories.	Pasteur Institute.	Works.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Total	1,82,90,846	64,64,562	60,65,700	74,800	25,74,805	11,47,148	2,42,354	17,21,477
Central Govt. . . .	12,95,886	4,12,163	3,66,569	..	2,73,593	2,21,180	5,253	17,128
N.-W. F. P. . . .	1,58,872	1,03,207	24,332	..	31,333	..	..	..
Punjab	20,14,030	7,91,545	9,64,790	74,800	1,25,559	21,049	35,365	922
U. P.	24,39,866	15,22,860	5,46,711	..	3,23,265	..	..	47,030
Bihar	11,57,370	4,14,040	3,76,802	..	1,77,228	30,176	15,124	1,44,000
Orissa	2,17,739	91,900	49,540	..	35,455	15,303	2,739	22,802
Bengal	40,36,321	6,49,177	26,37,455	..	6,03,952	79,149	42,164	24,424
C. P.	4,90,512	86,265	59,267	..	3,42,444	2,536	..	..
Bombay	27,29,804	6,57,356	1,05,594	..	1,75,448	3,34,873	13,612	14,42,921
Sind	2,52,420	1,15,899	71,951	..	37,746	23,867	2,957	..
Madras	26,14,910	12,68,490	7,68,749	..	1,57,977	4,07,398	9,714	2,582
Coorg	22,099	10,438	2,947	..	8,714	..	..	..
Assam	8,61,017	3,41,222	90,993	..	2,82,091	11,617	1,15,426	19,668

TABLE B.—DISTRIBUTION OF HEALTH STAFFS IN RURAL AND URBAN AREAS.

Rural Areas.

	Medical Officers of Health.				Epidemic Staff.	Sanitary and Health Inspectors.	Vaccinators.		School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)				M.	F.		
	Whole time.	Part time.	Whole time.	Part time.						
Total	146	3	93	2	827	1,258	6,413	73	27	1,422
N.-W. F. P.	...	...	...	...	4*	...	30	...	7	4*
Punjab	28	...	12	1	...	49	426	...	3	665
Delhi	1	1	...	...	...	8	3	...	5	24
U. P.	43	1	32	...	44	150	821	...	...	...
Bihar	10	...	10	...	185	86	998	1	8	149
Orissa	4	...	2	...	15	35	261	7	2	10
Bengal	30	1	16	1	386	592	2,159	52	2	480
C. P.	...	...	...	...	43	...	261	...	†	39
Bombay	2	...	...	...	59	4	303	...	...	51
Sind	...	...	1	...	...	1	75	1	...	...
Madras	27	...	19	...	28	331	616	11	...	...
Coorg	1	...	1	...	...	2	4	...	...	...
Assam	..	...	...	...	63	...	446	1	...	...
Ajmer-Merwara	...	...	...	...	...	...	10	...	...	...

* appointments sanctioned for rural as well as for urban areas.

Urban Areas.

	Medical Officers of Health.				Sanitary and Health Inspectors.	Vaccinators.		Inspectors of Vaccination.	School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)			M.	F.			
	Whole time.	Part time.	Whole time.	Part time.						
Total	142	9	113	7	1,127	947	49	81	72	11,838
N.-W. F. P.	1	1	3	1	10	8	1	6	6	...
Punjab	15	7	6	6	170	160	12	...	16	11,271
Delhi	3	...	...	...	20	14	...	...	11	23
U. P.	21	...	13	...	176	175	...	...	13	...
Bihar	10	1	2	...	93	74	2	7	...	33
Orissa	2	...	1	...	10	17	3	2	...	18
Bengal	26	...	...	...	103	134	16	8	8	146
C. P.	2	...	2	...	75	93	...	...	†	8
Bombay	28	...	51	...	109	52	...	1	8	230
Sind	6	...	2	...	24	11	2	1	1	...
Madras	26	...	33	...	312	172	13	17	8	...
Coorg	...	...	...	...	2	2	...	...	...	...
Assam	1	...	...	...	12	28	...	38	...	89
Ajmer-Merwara	1	...	...	...	11	7	...	1	1	25

† There are no officers appointed particularly for the medical inspection of schools. The work is done by the Subassistant Health Officers on epidemic duty and Assistant Medical Officers incharge of branch dispensaries.

Appendix V

relating to

Section VI.

TABLE—VACCINATION OPERATIONS PERFORMED IN BRITISH INDIA AND IN DIFFERENT PROVINCES DURING 1938-39.

Province.	Population.	Operations performed.			Percentage of success.		Children successfully vaccinated.		Total cost.	Average cost per successful case.	Rate of successful vaccinations per 1,000 of population.	Percentage of annual births successfully vaccinated.
		P.	R.	Total.	P.	R.	Under 1 year.	1 to 6 years.				
									Rs.	Rs. A. P.		
BRITISH INDIA . .	2,58,400,179	10,204,648	13,488,906	23,683,823	97	48	4,313,635	4,074,990	30,93,299	0 8 7	54	46
N.-W. F. P. . .	3,762,678	143,848	145,827	289,675	99	82	70,417	50,242	30,097	0 2 0	65	98
Punjab . . .	23,551,210	1,057,097	3,572,230	4,629,327	99	65	808,855	135,725	4,17,433	0 2 5	118	69
Delhi . . .	636,246	32,857	131,784	164,641	98	60	24,291	5,310	15,294	0 2 7	149	71
U. P. . . .	48,408,763	1,606,335	309,094	1,915,429	98	48	1,023,608	441,536	3,83,537	0 3 8	35	57
Bihar .	32,371,434	994,795	505,969	1,500,764	99	56	280,248	671,828	55,420	0 0 9	35	25
Orissa . . .	8,009,559	238,023	402,668	640,691	97	64	67,879	125,516	61,411	0 2 7	48	28
Bengal . . .	50,114,002	2,876,619	4,972,453	7,849,072	86	31	370,887	1,489,458	4,58,503	0 1 10	79	24
C. P. . . .	15,323,080	514,752	118,236	632,988	98	58	397,109	88,638	2,24,982	0 6 11	35	60
Bombay . . .	17,967,050	628,183	255,042	883,225	100	49	445,504	135,500	4,85,844	0 11 10	37	53
Sind . . .	3,887,070	137,013	83,162	220,175	100	26	66,410	53,989	1,16,882	0 13 6	35	86
Madras . . .	44,422,597	1,481,847	2,590,449	4,072,296	98	24	661,500	597,362	7,18,083	0 6 7	40	39
Coorg . . .	163,327	2,521	3,483	6,004	96	55	512	1,415	10,830	1 11 4	26	14
Assam . . .	9,247,857	463,800	391,234	855,034	95	60	78,910	274,437	1,06,402	0 3 1	66	33
Ajmer-Merwara .	535,306	26,958	7,275	34,233	92	85	17,505	4,034	8,581	0 4 5	58	85

P = Primary.
R = Revaccinations.

Appendix VI

relating to

Section VII.

TABLE—NUMBER OF TOWNS HAVING PROTECTED WATER SUPPLIES IN DIFFERENT PROVINCES.

	Towns having a population of over 50,000.		Towns having a population of 30,000—50,000.		Towns having a population below 30,000.		Total.			
	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Aggregate population.	Towns having a protected water supply.	Population of towns included in col. 10.
1	2	3	4	5	6	7	8	9	10	11
BRITISH INDIA . .	76	59	84	48	1,069	134	1,229	23,629,405	241	12,585,107
N.-W. F. P. . . .	1	1	1	1	15	6	17	299,284	8	206,293
Punjab	8	6	11	4	162	30	181	3,020,273	40	1,436,384
Delhi	2	2	...	...	4	3	6	504,702	5	495,427
U. P.	17	12	13	4	410	10	440	5,435,144	26	1,829,976
Bihar	6	5	6	3	57	2	69	1,495,138	10	760,243
Orissa	1	...	2	2	5	...	8	216,806	2	75,318
Bengal	5	4	17	15	96	33	118	2,351,407	52	1,474,083
C. P.	2	2	7	4	103	3	112	1,679,546	9	550,338
Bombay	7	6	12	5	112	18	131	3,806,892	29	2,507,158
Sind	4	3	...	...	22	2	26	685,202	5	456,507
Madras	22	18	15	10	46	15	83	3,715,160	43	2,654,109
Coorg	...	...	...	...	2	1	2	9,827	1	5,995
Assam	...	...	...	...	31	10	31	229,825	10	111,879
Ajmer-Merwara . .	1	...	...	...	4	1	5	180,199	1	21,397

Appendix VII

relating to

Section VIII

List of scientific papers by research workers under the Government of India, the Indian Research Fund Association, provincial Governments and Indian States published during 1938.*

A.—Papers published in the Indian Journal of Medical Research (I. J. M. R.).

Ahmad, B., and Gore, H. K.

A diet survey of fiftyone families of Ferozepore, Punjab. (Volume XXVI, No. 1).

Ahmad, B., Lal, R. B., and Roy, N. C.

Observations on the basal metabolism of healthy subjects under varying conditions of temperature and humidity. (Volume XXVI, No. 1).

Aykroyd, W. R., and Krishnan, B.G.

The treatment of stomatitis caused by diet deficiency. (Volume XXV, No. 3).

Aykroyd, W. R., Madhava, K. B., and Rajagopal, K.

The detection of malnutrition by measurements of arm, chest and hip. (Volume XXVI, No. 1).

Basu, K. P., and De, H. N.

Nutritional investigation of some species of Bengal fish. Part I. Biological value of the proteins of Ruhee (*Labeo rohita*) and Hilsa (*Clupea ilisa*) by the nitrogen balance and growth methods, and supplementary effect of fish on pulse proteins. (Volume XXVI, No. 1).

Nutritional investigation of some species of Bengal fish. Part II. Extraction and chemical analysis of the proteins of Ruhee (*Labeo rohita*) and Hilsa (*Clupea ilisa*). (Volume XXVI, No. 1).

Nutritional investigation of some species of Bengal fish. Part III. Determination of vitamin-A contents of the liver and body oils of Ruhee (*Labeo rohita*) and Hilsa (*Clupea ilisa*) by the biological method. (Volume XXVI, No. 1).

Biswas, M. M.

Absorption of hydrogen ions by serum globulin and its antibody. (Volume XXVI, No. 2).

Chakravarti, D. N., and Tyagi, N.

Studies in "effects of heat". Part I. Biochemical and physical changes in ten cases suffering from "effects of heat". (Volume XXV, No. 3).

Chopra, R. N., Chatterjee, R. G., De, N., and Ghosh, S.

A preliminary note on the chemistry and pharmacology of the leaves of *Skimmia laureola*, Hook, F. (Volume XXVI, No. 2).

Chopra, R. N., Das, N. N. and Mukerji, B.

The action of certain cardiac drugs on embryonic heart explants. (Volume XXVI, No. 1).

Chopra, R. N., Ghosh, S., and Dutt, A. T.

Some inorganic preparations of the Indian indigenous medicine. Part VI. *Samudra phena* (Volume XXVI, No. 2).

Chopra, R. N., Mukerji, B., and Chakravarti, M.

Studies on some dextro-rotatory hydrocupreidine derivatives. Part I. Comparative haemolytic activity. (Volume XXVI, No. 1).

Chopra, R. N., and Roy, A. C.

The effect of Seitz filtration on hæmolysins and the components of a hæmolytic system. (Volume XXVI, No. 1).

De, N. K., and Majumdar, B. N.

Further studies on factors affecting the vitamin-A activity of animal and vegetable products. (Volume XXV, No. 4).

The assimilation of carotene by rats from a 'poor Madrasi diet'; The influence of skimmed milk and calcium lactate. (Volume XXVI, No. 2).

* It is not claimed that list is complete.

De, N. K., Majumdar, B. N., and Sundararajan, A. R.

The vitamin-A activity of some fish oils and vegetable foods. Parts I and II. (Volume XXVI, No. 2).

De, P., and Bhattacharyya, S.

A comparative study of glycolysis in normal and diabetic blood. (Volume XXV, No. 4).

Glycolysis in drawn blood in twentyfour hours. (Volume XXV, No. 4).

De. P., and Chatterjee, C. C.

The rôle of formalin in the estimation of nitrogen in body fluids. (Volume XXV, No. 4).

De, S. P., and Basu, U. P.

Chemotherapeutic study of streptococcal infections. (Volume XXVI, No. 2).

Dey, B. B., Lakshmikantham, P., David, J. C., and Krishnaswami, R.

Preparation, properties, and pharmacological action of p-aminobenzoyl aminomethyl-1-hydrocotarnine. (Volume XXV, No. 3).

Dharmendra and Lowe, J.

Attempts to cultivate *M. leprœ muris*. (Volume XXV, No. 4).

Ghosh, B. N., and De, S. S.

Investigation on the isolation of the neurotoxin and hæmolysin of cobra (*Naja naja*) venom. (Volume XXV, No. 3).

Giri, K. V.

The availability of phosphorus from Indian foodstuffs. (Volume XXV, No. 4).

Giri, K. V., and Doctor, N. S.

Pyrophosphate in the determination of vitamin-C content of plant and animal tissues. (Volume XXVI, No. 1).

Goswami, H., and Basu, U. P.

'Available' iron in Indian foodstuffs. (Volume XXV, No. 4).

Goyal, R. K.

A serological study of the actinomyces. (Volume XXV, No. 4).

Greval, K. S., and Kochhar, B. D.

Vitamin-A contents of ghee. (Volume XXV, No. 3).

Greval, S. D. S., Das, B. C., and Sen Gupta, P. C.

On Wassermann reaction. Part III. The positive serum. (Volume XXVI, No. 2).

Iyengar, N. K., Sehra, K. B., and Mukerji, B.

Studies on the protease of Cobra venom. (Volumn XXVI, No. 2).

Kamala Bhagvat.

Enzyme method for the estimation of adrenaline in suprarenal glands. (Volume XXV, No. 4).

Krishnan, B. G.

Skimmed milk and the growth of school children. (Volume XXV, No. 3).

Lahiri, D. C.

Use of non-specific substances in the production of tetanus and diphtheria antitoxin. (Volume XXVI, No. 1).

Studies on the utility of Ramon's flocculation test in the standardization of Tetanus antitoxin. (Volume XXVI, No. 2).

Experimental studies to guide the selection of the most satisfactory type of anti-Welchii serum for the prevention and treatment of gas gangrene in man. (Volume XXVI, No. 2).

Lal, R. B., Ahmad, B., and Roy, S. C.

Investigations into the epidemiology of epidemic dropsy. Part VI. Allylisothiocyanate as an ætiological factor in epidemic dropsy. (Volume XXVI, No. 1).

Linton, R. W., Mitra, B. N., and Seal, S. C.

Electrophoresis and metabolism of some vibrio strains in relation to variability and chemical classification. (Volume XXVI, No. 2).

Linton, R. W., Seal, S. C., and Mitra, B. N.

Chemical and serological variation in single-cell cultures of *vibrio choleræ* and related organisms. (Volume XXV, No. 3).

Linton, R. W., Shrivastava, D. L., and Seal, S. C.

Studies on the specific polysaccharides of the vibrios. Part I. The effect of the growth-medium. (Volume XXV, No. 3).

Linton, R. W., Shrivastava, D. L., Seal, S. C., and Mookerji, S. P.

Studies on the specific polysaccharides of the vibrois. Part II. Chemistry and serology. (Volume XXVI, No. 1.).

Mahal, H. S.

Studies on blood choline esterase. (Volume XXV, No. 3).

Majumdar, B. N., and De, N. K.

The oxalic-acid content of some Indian foodstuffs. (Volume XXV, No. 3).

Maplestone, P. A., and Dey, N. C.

Laboratory tests on the fungistatic and fungicidal effects of various substances. (Volume XXV, No. 3).

Mukerji, B., and Guha, R. C.

The effects of anterior pituitary extracts and choline on the liver-fat of rabbits. (Volume XXVI, No. 1).

Mukerji, B., and Iyengar, N. K.

Studies on some dextro-rotatory hydrocupreidine derivatives. Part II. Comparative action on digestive enzymes. (Volume XXVI, No, 1).

Nandi, B. K., and Dikshit, B. B.

A new colorimetric test for plasmoquine. (Volume XXV, No. 4).

Napier, L. E., and Majumdar, D. N.

Hæmatological studies in Indians. Part IX. The analysis of the hæmatological findings in 57 cases of anæmia in pregnant tea-garden coolie women, with special reference to the results of treatment. (Volume XXVI, No. 2).

Narasimhamurthy, G.

The nitrogen complex of Indian foodstuffs. Condiments: Part II. Chillies (*Capsicum annum*) and coriander seeds (*Coriandrum sativum*). (Volume XXV, No. 4).

Pal. R. K., and Narindra Singh.

The effect on rats of supplementing a South Indian diet with calcium and phosphorus. (Volume XXV, No. 3).

Further studies on the effect in rats of supplementing a South Indian diet with calcium and phosphorus. (Volume XXVI, No. 1).

Pandit, C. G., Sanjiva Rao, R., and Shortt, H. E.

Response of the chorio-allantoic membrane of the developing chick-embryo to inoculation with various substances with special reference to *B. proteus*, X 19. (Volume XXV, No. 3).

Pandit, S. R., and Maitra, N. M.

Vibrios in natural water sources in Assam. (Volume XXVI, No. 1).

Pasricha, C. L., Chatterjee, D. N., and Das, P. C.

The distribution and characteristics of vibrios isolated from certain non-human sources in Calcutta. (Volume XXVI, No. 1).

Patwardhan, V. N., and Chitre, R. G.

Studies in calcium and phosphorus metabolism. Part I. The calcium and phosphorus content of the soft tissues of normal rats. (Volume XXV, No. 3).

Studies in calcium and phosphorus metabolism. Part II. The effect of toxic doses of vitamin D on the ash, Ca, and P content of the bones and on the excretion of N, Ca, and P in the albino rats. (Volume XXVI, No. 2).

Radhakrishna Rao, M. V.

Studies on vitamin-A deficiency. Part III. Lesions of the peripheral nervous system. (Volume XXV, No. 3).

Hæmatological investigations in South India. Part IV. Hæmoglobin in normal pregnancy. (Volume XXV, No. 4).

The study of Myelin degeneration in polarized light. (Volume XXVI, No. 1).

Raja, K. C. K. E., Satya Swaroop, Basak, K. C., and Lal, R. B.

Application of analysis of variance to mortality rates. (Volume XXVI, No. 1).

Rajagopal, K.

The basal metabolism of Indian and European men on the Nilgiri Hills (South India) (Volume XXVI, No. 2).

Ranganathan, S.

The 'available' iron in some common Indian foodstuffs, determined by the α, α'-dipyridine method. (Volume XXV, No. 3).

Variation in the iron content of foodstuffs and the problem of iron requirements. (Volume XXVI, No. 1).

Rao, M. Narasimha.

Vitamin C and peptic ulcer. (Volume XXVI, No. 1).

Rao, R. Sanjiva.

Cultivation of sheep-pox virus on the chorio-allantoic membrane of the chick embryo. (Volume XXVI, No. 2).

Ray, N. N., and Das, G. C.

The immunization of horses for the production of high-titre tetanus antitoxin. Part I. (Volume XXV, No. 3).

The immunization of horses for the production of high-titre tetanus antitoxin. Part II. (Volume XXVI, No. 1).

Ray, S. N., and Ganguly, R.

Urinary composition of normal Bengalee subjects. (Volume XXVI, No. 2).

Observations on the metabolic activity of patients suffering from epidemic dropsy. Part I. Urinary composition of epidemic-dropsy patients. (Volume XXVI, No. 2).

Roy, A. C.

Lipolytic activity of the venous (Cobra and Russell's viper). (Volume XXVI, No. 1).

Roy, A. C., and Chopra, R. N.

Some biochemical characteristics of snake venom. (Volume XXVI, No. 1).

Roy, D. N.

On the number of eggs of the common house-frequenting flies of Calcutta. (Volume XXVI, No. 2).

Sankaran, G., and Radhakrishna Rao, M. V.

Hæmotological investigations in South India. Part III. The mean red cell diameter. (Volume XXV, No. 4).

Sankaran, G., and Rajagopal. K.

Hæmatological investigations in South India. Part I. The estimation of hæmoglobin. (Volume XXV, No. 3).

Hæmatological investigations in South India. Part II. The effect of the administration of iron on the hæmoglobin level in Indian girls and young women. (Volume XXV, No. 3).

Hæmatological investigations in South India. Part V. The effect of altitude on hæmoglobin content. (Volume XXV, No. 4).

Satya Swaroop.

Numerical estimation of *B. coli* by dilution method. (Volume XXVI, No. 2).

Sen, B. B.

Studies on meningococcus bacteriophage. (Volume XXVI, No. 2).

Sen, P.

A note on the overwintering of the house fly, *Musca domestica*. (Volume XXVI, No. 2).

Shortt, H. E., Hawley, H., and Swaminath, C. S.

Iron-hæmatoxylin staining technique : An illusion. (Volume XXVI, No. 1).

Shortt, H. E., Pandit, C. G., and Rao, R. Sanjiva.

The virus of sandfly fever in culture and certain of its properties. (Volume XXVI, No. 1).

Shortt, H. E., Pandit, S. R., Menon, K. P. and Swaminath, C. S.

The absence of effective immunity after cure of protozoal infections. (Volume XXV, No. 3).

Shourie, K. L., and Narindra Singh.

A diet survey of a group of Sikh soldiers. (Volume XXV, No. 3).

Sinton, J. A.

The successful transmission of cutaneous leishmaniasis by inoculation to man from a natural lesion occurring on a dog in India. (Volume XXV, No. 3).

Sokhey, S. S., Gokhale, S. K., Malandkar, M. A., and Billimoria, H. S.

Red cells, hæmoglobin, colour index, saturation index, and volume index standards. Part II. Normal Indian women : A study based on the examination of 101 women. (Volume XXV, No. 3).

Stewart, A. D., and Ghosal, S. C.

On the value of Wilson and Blair's bismuth sulphite medium in the isolation of *Bact. typhosum* from river water. (Volume XXV, No. 3).

Sundararajan, A. R.

Phytin-phosphorus content of Indian foodstuffs. (Volume XXV, No. 3).

Swaminathan, M.

The relative amounts of the protein and non-protein nitrogenous constituents occurring in foodstuffs and their significance in the determination of the digestibility co-efficient of proteins. (Volume XXV, No. 4).

The relative value of the proteins of certain foodstuffs in nutrition. Part V. Supplementary values of the proteins of *Eleusine coracana* (Ragi) and of certain pulses and skimmed milk powder studied by the nitrogen balance and the growth method. (Volume XXVI, No. 1).

The relative value of the proteins of certain foodstuffs in nutrition. Part VI. General conclusions. (Volume XXVI, No. 1).

A chemical method for the estimation of nicotinic acid in biological materials. (Volume XXVI, No. 2).

Taylor, J., and Ahuja, M. L.

Incidence and characters of vibrios in waters in Northern India. (Volume XXVI, No. 1).

Vardon, A. C., and Datta Roy, B. K.

A papain-casein culture medium for the preparation of bacteriophage and for general laboratory use. (Volume XXVI, No. 2).

Venkataraman, K. V., and Pandit, C. G.

An epidemic of cholera in a rural area in South India caused by the 'Ogawa' type of V. *choleræ*. (Volume XXV, No. 3).

Veeraraghavan, N., and Philipsz, G. L. C.

Cultivation of the rabies virus on the chorio-allantoic membrane of the developing egg. (Volume XXVI, No. 2).

Wilson, H. E. C., and Mitra, D. D.

A diet and physique survey in Assam, rural Bengal, and Calcutta. (Volume XXVI, No. 1).

Wilson, H. E. C., and Roy, G. K.

The flavine and vitamin-B_6 (antidermatitis) content of Indian foodstuffs. (Volume XXV, No. 4).

Wilson, H. E. C., and Roy, N. C.

Observations on the basal metabolism of Indian boys in Calcutta. (Volume XXV No. 4).

B.—Papers published in the Indian Medical Gazette during 1938. Volume LXXIII.

Ali P. M.

A rat-flea survey of Mattanchery (Cochin) (1937). (Page 409).

Allen, F. R. W. K., and Basu, I.

A simple method of obtaining hyper-extension for the application of a plaster of paris jacket in cases of fracture of the thoracic and lumbar vertebrae. (Page 341).

Bana, F. D.

Control of *stegomyia fasciata* (*aedes aegypti*) mosquitoes in Indian country craft by a mosquito-proof metal cap for drinking water receptacles. (Page 344).

Barton, R. M.

Methods of destruction of tubercle bacilli in the sputum for use in Indian homes, with some experiments. (Page 559).

Basu, U. P., and De, S. P.

The chemotherapy of streptococcal infections. (Page 35).

Benjamin, P. V.

The seriousness of tuberculosis in India as shown by study of incidence and type. (Page 540).

Benjamin, P. V., and Barton, R. M.

Deductions from experience in a tuberculosis expatients' colony in India. (Page 545).

Bhatia, S. L.

Conditioned reflexes. (Page 226).

Bliss, C. H.

Spinal anaesthesia. (Page 474).

Bose, J. P.

Protamine zinc insulin. (Page 390).

Chakravarti, J.

Pre-cancerous conditions of the cervix uteri and their treatment. (Page 661).

Chakraverti, S. N., and Roy, S. N.

Experiments on the stability of seminal stains from a medico-legal standpoint. (Page 412).

Charlewood, G. P.

Induction of labour. (Page 733).

Chatterjee, D. N., and Malik, K. S.

The bacteriological examination and the hydrogen-ion concentration of the urine of a series of 122 cholera patients. (Page 612).

Chatterjee, H. N.

Some clinical aspects of anaemia in pregnancy in Indian women living in Bengal Page 267).

Chaudhuri, R. N.

Spontaneous subarachnoid haemorrhage. (Page 466).

Chellappa, E. S.

Premedication in sodium evipan anaesthesia—A study of 535 cases. (Page 342).

Chopra, B. L.

Antimalarial measures in the railway area at Delhi. (Page 150).

Chopra, R. N.

Incurables. (Page 747).

The physiology of the individual in the tropics. Part I. (Page 40).

The physiology of the individual in the tropics. Part II. (Page 102).

Present position of antimalarial drug therapy in India. (Page 418).

Chopra, R. N., and Chopra, G. S.

The opium smoking habit in India. Part I. (General survey). (Page 81).

Present position of the opium smoking habit in India. Part II. Preparations of opium used for smoking and mode of indulgence. (Page 132).

Present position of the opium smoking habit in India. Part III. Studies on the physical and mental effects produced by opium smoking. (Page 193).

Chopra, R. N., and Das Gupta, B. M.

A note on the therapeutic efficiency of soluseptasine in simian malaria (P. *Knowlesi*). (Page 395).

Chopra, R. N., Das Gupta, B. M., and Sen, B.

Studies on the action of synthetic anti-malaria drugs on Indian strains of malaria. (Page 667).

Choudhuri, S., and Mangalik, V. S.

The anaemias in pregnancy. A haematological, clinical and statistical study. (Page 257).

Chowhan, J. S., and Chopra, R. N.

The use of cobra venom in nerve leprosy. (Page 720).

Cropper, C. F. J., and Kahali, B, S.

Adult haemoglobin standards in Burma. (Page 139).

Cruickshank, M. M.

Oxycephaly. (Page 595).

Thyroid metastaspes in bone. (Page 656).

Das Gupta, B. M.

Experiments on the spirillum of rat-bite fever. (Page 14).

Leptospirosis in India. (Page 449).

Spontaneous infection of guinea-pigs with a spirillum, presumably *spirillum minus* Carter, 1887. (Page 140).

Das Gupta, B. M., and Chopra, R. N.

Studies on the action of synthetic drugs on simian malaria. (Page 665).

de Monte, A. J. H., and Gupta, S. K.

Blood culture in cholera. (Page 670).

Dhunjibhoy, J. E.

Treatment of schizophrenia by inducing epileptiform shocks by the drug Cardiazol. An experimental study of 42 cases. (Page 321).

Dutta, P. C.

Management of head injury cases in rural practice. (Page 26).

Frimodt-Möller, C.

A study of the anti-tuberculosis activities in the West, with some suggestions for the campaign against tuberculosis in India. (Page 513).

Galstaun, G.

The radiological examination of the stomach and duodenum. (Page 74).

Gollerkeri, P. G.

The subcutaneous nodule of rheumatism. (Page 207).

Gore, R. N.

Cinchona febrifuge in the treatment of malaria. (Page 608).

Ichthyol as a treatment of guinea-worm. (Page 139).

Goyal, R. K.

The guinea-pig in the laboratory diagnosis of tuberculosis. (Page 282).

Greval, S. D. S., Sen Gupta, P. C. and Das, B. C.

Latent syphilis in the Tropics. (Page 585).

Hance, J. B.

Some recent advances in surgery. (Page 21).

Hare, K. P.

Preliminary report on an experiment in coolie-line sanitation. (Page 609).

Harrington, F. T.

Investigation and conservative treatment of the nasal factor in asthma. (Page 725).

Hassett, C. J.

A cholera epidemic in Swat State, N. W. Frontier, 1937. (Page 602).

Hayes, S. N., and Sami, A.

Clinical investigation on the value of proseptasine as a prophylactic in puerperal infection. (Page 328).

Hayward, E. W., and Mehta, B. L.

The mortality of operations for vesical calculus in India. (Page 659).

Jayaram, B., and Sheriff, A. K.

Role of solaria in anti-tuberculosis work. (Page 557).

Joseph, T. J.

The campaign against tuberculosis in Italy. (Page 522).

Kaikini, V. M.

Regional ileitis. (Page 214).

Kamra, B. L.

Incidence of pulmonary tuberculosis in the Punjab villages. (Page 477).

Karamchandani, P. V.

Short note on an epidemic of chickenpox in the Central Jail, Cannanore. (Page 276).

Karamchandani, P. V., and Miller, C. B.

Typhoid fever presenting some unusual features. (Page 220).

Kasliwal, R. M.

Mental hygiene and its significance. (Page 619).

Kelly, G.

A note on typhoid myocarditis regarding a paper by H. E. Murray on some observations concerning the recent epidemic in Calcutta. (Page 396).

Kini, M. G., and Kesavaswami, P.

Spondylolisthesis. (Page 658).

Kini, M. G., and Rao, D. V.

Volvulus as a cause of intestinal obstruction. (Page 471).

Kirwan, E. O'G.

Early ophthalmologists in Calcutta. (Page 423).

The surgical treatment of epidemic dropsy glaucoma. (Page 654).

Kundu, K. P., and Pa How, V.

Prawns as a possible vector of v. cholerae. (Page 605).

Lahiri, M. N., and Das, P. C.

Vibrios from certain non-human sources. (Page 670).

Lowe, J.

A note on racial variation in leprosy with particular reference to Indian and Burmese races. (Page 591).

Maitra, G. C., Sen Gupta, P. N., and Thant, U.

Cholera epidemics in Burma and the type of vibrio associated with them. (Page 406).

Mallick, S. M. K., Ali, S., and Singh, B.

Myeloid Leukaemia treated by deep x-ray therapy. (Page 19).

Mangalik, V. S., and Stott, H.

The incidence of rheumatic infection in India, Part I. (Page 203).

Manson, D.

A method of antilarval oiling for rivers. (Page 284).

Maplestone, P. A.

A new filarial worm from a human being. (Page 8).

Maplestone, P. A., and Ghosh, L. M.

Herpes Zoster. Experiments with tissue lysate as a therapeutic agent. (Page 212).

Maplestone, P. A., and Mukerji, A. K.

The treatment of ascariasis. (Page 326).

Michelson, E. G.

An apparatus for continuous oiling of streams. (Page 612).

Minchin, R. L. H.

Variations in the platelet count in typhus associated with haematuria. (Page 379).

Mitra, D. D.

A study of the dietary habits of some communities living at Calcutta. (Page 280).

Mukerji, B.

The ergot problem and the practitioner. (Page 355).

Murray, H. E.

Some observations concerning the recent typhoid epidemic in Calcutta (with a note on typhoid myocarditis by G. Kelly). (Page 396).

Napier, L. E.

The specific treatment of malaria. (Page 160).

Napier, L. E., Chaudhuri, R. N., and Rai Chaudhuri, M. N.

Gastric acidity in health and disease in India. (Page 65).

Napier, L. E., Das Gupta, C. R., Chaudhuri, R. N., Sen, G. N., Rai Chaudhuri, M. N., Sen Gupta, P. C., and Majumdar, D. N.

Anahaemin in tropical macrocytic anaemia. (Page 385).

Napier, L. E., and Sen Gupta, P. C.

Sternum puncture, I.—The findings in normal Indians. (Page 1).

Negre, L., and Goyal, R. K.

B. C. G. vaccination in practice. (Page 566).

History of immunization against tuberculosis. (Page 144).

Norman, C. E. R.

Colour perception, and colour blindness tests. (Page 402).

O'Connor, M.

Bacteriophage treatment of dysentery in private practice. (Page 210).

Pal, R. K., and Singh, N.

The effect on rats of supplementing a North Indian diet with vegetable proteins (sprouting pulses) and calcium. (Page 469).

Pasricha, C. L., Chatterjee, D. N., and Malik, K. S.

The hydrogen-ion concentration of cholera stools. (Page 346).

Pasricha, C. L., Chatterjee, D. N., and Pal, B. M.

Studies on the potency of prophylactic vaccines. I.—Cholera vaccine. (Page 463).

Pasricha, C. L., and Chopra, G. S.

The treatment of splenomegaly by injections of milk. (Page 218).

Pasricha, C. L., de Monte, A. J. H., and Chatterjee, B. C.

Vibrio cholerae from material obtained by liver puncture during life. (Page 405).

Pasricha, C. L., Goyal, R. K., and Lal, S.

The hydrogen-ion concentration of human faeces. (Page 141).

Pasricha, C. L., Lahiri, N. N., and Das, P. C.

The isolation of vibrio cholerae from non-cholera individuals. (Page 669)

Pasricha, C. L., Lal, S., and Goyal, R. K.

A bacteriological study of curdled milk. (Page 94).

Pasricha, C. L., Lal, S., and Malik, K. S.

The specific gravity of serum of epidemic dropsy patients. (Page 283).

Phipson, E. S.

A case of adrenal insufficiency simulating syndrome. (Page 277).

Pillai, S. C.

Observations on the mottled condition of human teeth endemic in a certain locality of Nagercoil in Travancore, South India. (Page 408).

Rajam, R. V.

Report of a case of early acquired syphilis in a patient with tertiary stigmata of untreated yaws. (Page 735).

Rajam, R. V., and Tampi, R. B.

Post-arsphenamine blood dyscrasias. (Page 337).

Rao, M. N.

Peptic ulcer in northern Circars. (Page 454).

Vitamin B and peptic ulcer. (Page 457).

Rao, M. V. R.

Treatment of phrynoderma by vitamin-A concentrate. (Page 461).

Rao, S. R.

Some epidemiological features of plague in Bengal with special reference to Calcutta. (Page 671).

Ray, P. N.

Some unusual joint lesions. (Page 10).

Ray, P. N., Alam, K. S., and Ghosh, B. K.

Chemo-therapy in acute surgical infections with Prontosil and allied drugs. (Page 649).

Raymond, R. L., De, K. K., and Nyun, U. S.

Hobb's treatment with glycerine applied to male urethra in gonorrhoea. (Page 729).

Rishworth, H. R.

Adult filarial worm of unknown species removed from the skin of a human subject. (Page 7).

Riste, R. A.

Tuberculosis in the zenana. (Page 551).

Roy, S. C.

Bertiella studeri a natural tape worm parasite of monkeys, in a Hindu child. (Page 346).

Sami, M. A.

Hydatid disease in the Punjab. (Page 90).

Seal, S. C.

Diet and the incidence of disease in India. (Page 291).

Simeons, A. T. W.

Follow-up of a mass treatment with injectable atebrin. (Page 713).

Sivalingam, V.

Enumerative studies in benign tertian malaria. (Page 715).

Smith, R. O. A., McGuire, J. P., Stephens, E. D., and Lahiri, B. N.

Treatment of animals with anti-rabic vaccine. (Page 736).

Spackman, W. C.

An Obstetric cot. (Page 404).

Stott, H.

On the illustration of the rheumatic processes in a modern museum of pathology. (Page 129).

The incidence of rheumatic infection in India. Part II. (Page 271).

On the necessity of teaching the frequency of rheumatic infection in young Indians. (Page 330).

Strickland, C.

Malaria in relation to the coastal lagoons of Bengal and Orissa. (Page 399).

Strother-Smith, F. F.

Anti-mosquito measures in Cantonments with special reference to 'Dry day' instituted in 1927. (Page 606).

Syddiq, M. M.

Illustrations explaining an article on *siphunculina funicola* (eye-fly). (Page 468).

Siphunculina funicola (eye-fly). (Page 17).

Siphunculina funicola (eye-fly). (Page 254).

Some observations of practical importance and interest for the malariologists. (Page 676).

Taylor, M.

Convulsion therapy in schizophrenia. (Page 596).

Thakur, K. S.

An unusual case of multiple stones in the ureter. (Page 98).

Torpy, C. D.

Suspected botulism : A report on two cases. (Page 600).

Ukil, A. C.

Anti-tuberculosis work in Bengal. (Page 525).

Vere Hodge, E. H.

Note on the juvenile type of rheumatism in Bengal. (Page 275).

Viswanathan, R.

Incidence of bronchiectasis in asthma. (Page 138).

Modified technique for phrenic evulsion. (Page 220).

C.—Papers published in the Journal of the Malaria Institute of India, Volume I, 1938.

Afridi, M. K.

Observations on extra-abdominal spleen in monkeys infected with *P. cynomolgi* and *P. knowlesi*. (No. 4, December 1938).

Afridi, M. K., and Majid, S. A.

Observations on the range of dispersion of *Culex fatigans* and its infiltration into the Delhi urban area. Part I (No. 2, June 1938).

Afridi, M. K., and Majid, S. A.

Malaria in Bahrein Islands (Persian Gulf). (No. 4, December 1938).

Afridi, M. K., Majid, S. A., and Jaswant Singh.

Malaria in Kutch State. (No. 2, June 1938).

Barber, M. A., and Rice, J. B.

Malaria in Poona and in its vicinity. (No. 1, March 1938).

Basu, B. C.

Studies on a malarial infection in a paddy bird. (No. 3, September 1938).

Butt, N. M.

An inexpensive apparatus for mixing larvicides. (No. 2, June 1938).

Chopra, R. N., and Basu, B. C.

Studies on the effect of anti-malarial drugs upon the infectivity of patients to mosquitoes. Part II. 'Cilional'. (No. 4, December 1938).

Covell, G.

The Malaria Survey of India, 1927-1937. (No. 1, March 1938).

Covell, G., Mulligan, H. W., and Afridi, M. K.

An attempt to control malaria by the destruction of adult mosquitoes with insecticidal sprays. (No. 1, March 1938).

Dogra, J. R.

Abstract. A clinical study of malaria amongst Indian troops at Bannu. (No. 1, March 1938).

A Malaria Survey of Bannu Cantonment (1932-33). (No. 1, March 1938).

Iyengar, M. O. T.

Egg of *Anopheles leucosphyrus* Dön. (No. 4, December 1938).

Lazarus, M.

A rapid method of mosquito dissection. (No. 3, September 1938).

Menon, M. A. V.

A note on the eggs of *Anopheles varuna* Iyengar and *Anopheles fluviatilis* James. (No. 2, June 1938).

The egg of *Ficalbia* (*Mimomyia*) *hybrida* Leicester. (No. 2, June 1938).

A trematode parasitic in anopheles mosquitoes. (No. 4, December 1938).

Mitra, K.

Abstract. Increase of malaria in Manbhum, 1936. (No. 2, June 1938).

Rao, A. M. S., Sweet, W. C., and Rao, B. A.

Measurements of wings of two forms of *A. stephensi*. (No. 1, March 1938).

Rao, B. A., Sweet, W. C., and Rao, A. M. S.

Ova measurements of *A. stephensi* type and *A. stephensi* var. *mysorensis*. (No. 3, September 1938).

Rao, T. R., and Russell, P. F.

Some field observations on the swarming and pairing of mosquitoes, particularly *A. annularis*, in South India. (No. 4, December 1938).

Rice, E. M., and Roy, B. K. D.

A rapid method for the estimation of the arsenious oxide content of Paris green. (No. 2, June 1938).

Roy, D. N.

A note on the larva of *A. varuna* Iyengar. (No. 3, September 1938).

A note on Shute's technique of enumerating sporozoites in an emulsion of salivary glands. (No. 3, September 1938).

On the control of malaria-mosquitoes in Bengal by the use of predacious fish and on the habits of two of them. (No. 4, December 1938).

Roy, D. N., Chandra, S. N., and Siddons, L. B.

On the presence of a zoophilic race of *A. stephensi* in Calcutta. (No. 4, December 1938).

Russell, P. F.

Malaria due to defective and untidy irrigation. A preliminary discussion. (No. 4. December 1938).

Russell, P. F., Menon, M. K., and Rao, T. R.

Epidemiology of malaria in Pattukkottai taluk, Tanjore District, Madras Presidency, India. (No. 3, September 1938).

Sen, P.

Anopheles sundaicus (*ludlowi*) and malaria in Calcutta. (No. 1, March 1938).

On some physico-chemical and vegetation factors of the breeding places of *Anopheles sundaicus* Rodenw. (No. 3, September 1938).

Senior-White, R.

On malaria transmission in the Jeypore Hills. Part II. A second year's results. (No. 2, June 1938).

Senior-White, R., and Das, B. K.

On malaria transmission in the Singhbhum Hills. (No. 2, June 1938).

Sweet, W. C., and Rao, B. A.

Measurements of *A. Culicifacies Ova.* (No. 1, March 1938).

Sweet, W. C., Rao, B. A., and Rao, A. M. S.

Cross-breeding of *A. stephensi* type and *A. stephensi* var *mysorensis.* (No. 2, June 1938).

Syddiq, M. M.

Abstract. Some observations with the ' Entoray' machine. (No. 4, December 1938).

Wats, R. C., and Bharucha, K. H.

Abstract. Larvicides for antimosquito work, with special reference to. Cashew-nut shell oil. (No. 2, June 1938).

D.—Papers published in other journals during 1938.

Action, H. W.

Ankylostomiasis or hookworm disease. British Encyclopaedia of Medical Practice, Volume I, page 587 (Butterworth & Co., Ltd., London).

Afridi, M. K.

Antimalaria operations in Delhi. Proc. Nat. Inst. Sci. Ind., Volume IV, No. 2.

Banerjea, R. K.

Sero-positive reaction for syphilis in leprosy. Proceedings of the 25th Indian Science Congress, Part III, page 243.

Banerjea, R. K., and Sen, A. K.

Study of the Eijkman's test and modification as given by coliform organisms isolated from human faeces. Proceedings of the 25th Indian Science Congress, Part III, page 240.

Basak, K. C.

Infant mortality in British India. Jour. of Pediatrics, June 1938.

Basu, U. P.

A few suggestions for the prevention of smallpox epidemic in Calcutta. Calcutta Medical Journal, March 1939.

Causes of deterioration of health of Bengali women. Journal of the Tuberculosis Association of Bengal, June 1939.

Spirochaetal jaundice in Calcutta. Calcutta Medical Journal. October 1939.

Burridge, W.

A new law of cardiac stimulation. (Arch. Internat. de Pharm., et de Therap., LIX, page 450, 1938).

A new law of natural stimulation. (Prov. Internat. Physiol. Congress, Zurich, 1938).

Burridge, W. and Seth, D. N.

Experiments with choline. (Proceedings of Indian Science Congress, 1938).

Chatterjee, N. R., Ghosh, S., and Chopra, R. N.

Studies on the enzymes of the seeds of *Butea Frondosa*. Part I. Proteolytic enzyme. Journal of the Indian Chemical Society, Volume XV, page 101.

Studies on the enzymes of the seeds of *Butea Frondosa*. Part II. Lipolytic enzyme. Journal of the Indian Chemical Society, Volume XV, page 107.

Chatterjee, P. K., and Ukil, A. C.

Some experience in gold therapy in pulmonary tuberculosis. Trans. Med. Coll. Re-Union, 10th Session, December, 1938.

Chaudhuri, R. N.

Treatment with sulphanilamide, with special reference to its toxic effects. Transactions of the Medical College Re-Union, Ninth Session, Volume I, page 38.

Chopra, G. S.

Some indications and contra-indications for the use of hypnotics and analgesics in common practice. Parts I, II, III and IV, Calcutta Medical Review, Volume 1.

Chopra, R. N.

Present position of antimalarial drug therapy in India. Proceedings of the Nationa Institute of Sciences of India, Volume IV, page 145.

Antimalarial remedies: natural and synthetic. Calcutta Medical Journal, Volume XXXIV, page 183.

Dropsy, epidemic. British Encyclopaedia of Medical Practice, Volume IV, page 220. (Butterworth & Co., Ltd., London).

Lathyrism. British Encyclopaedia of Medical Practice, Volume VII, page 651. (Butterworth & Co., Ltd., London).

Chopra, R. N., and Badhwar, R. L.

A note on collection and cultivation of medicinal plants. Agriculture and Livestock in India, Volume VIII, Part III, page 222.

Chopra, R. N., Das Gupta, B. M., and Sen, B.

Experimental studies on ape malaria with reference to its use in malaria therapy for nervous conditions. Proceedings of the National Institute of Sciences of India, Volume IV, page 165.

Chopra, R. N., and Ghosh, N. N.

Chemische Untersuchung der indischen aloerten aloe vera, aloe Indica, boyle. Archiv der pharmazie und Berichte der Deutschen Pharmazeutischen Gesellschaft Band 276, page 340.

Chopra, R. N., Rao, S., and Mukerji, S.

The relative composition of blood and lymph in filarial infection. Proceedings of the 25th Indian Science Congress, page 291.

Christophers, S. R., Sinton, J. A., Covell, G., and Barraud, P. J.

Synoptic table for the identification of the anopheline mosquitoes of India. Health Bulletin No. 10, Malaria Bureau No. 2, 3rd edition revised by I. M. Puri.

Cruickshank, M. M.

Haematemesis. Journal of Indian Medical Association, Vol. VII, No. 9, June 1938.

Das Gupta, B. M.

Transmission of *P. Inui* to man. Proceedings of the National Institute of Sciences of India, Volume IV, page 241.

Rat-bite fever. British Encyclopaedia of Medical Practice, Volume X, page 477. (Butterworth & Co., Ltd., London).

Das Gupta, B. M., and Chatterjee, H.

Observations on a *Bodo-like* flagellate persistently occurring in the faeces of a human being. Parasitology, Volume XXX, page 56.

Das Gupta, C. R.

A plea for the adoption of modern haematological methods in the study of anaemias. Transactions of the Medical College Re-Union, Ninth Session, Volume I, page 75.

Das Gupta, S. M.

The nutritional value of ghee and its industrial possibilities in Bengal. Science and Culture, February 1939.

De, K. N.

Diet in pulmonary tuberculosis. Transactions of the Medical College Re-Union, Volume II (1938-39).

De, M. N.

Observations on the dysenteric conditions among Europeans of Calcutta. British Medical Journal, May 7, 1938.

Lymphatic *leukaemia* in children. Ind. Jr. Ped., July 1938.

Dikshit, B. B.

Pharmacology of plasmoquine with special reference to its action. Procd. Nat. Inst. Science, Volume IV, No. 2, 1938, page 161.

Acetylcholine formation by tissues. Quart. Jour. Experimental Physiol., Volume 28, No. 3, 1938, pp. 243-251.

Dutt, A. T., Chatterjee, N. R., Ghosh, S., and Chopra, R. N.

Chemische Untersuchung der Wurzeln von Paris polyphylla. Teil I. Archiv der Pharmazie und Berichte der Deutschen Pharmazeutischen Gesellschaft. Band 276, page 343.

Dutt, A. T., Ghosh, S., and Chopra, R. N.

Chemische Untersuchung der Wurseln von Hemidesmus Indicus. Archiv der Pharmazie und Berichte der Deutschen Pharmazeutischen Gesellschaft, Band 276, page 333.

Ghosh, L. M., Ghosh S., Chatterjee, N. R., and Dutt, A. T.

Actinomyces: Their biochemical reactions as aids in their classification. Part I. Reduction of nitrates. Journal of the Indian Botanical Society, Volume XVII, page 279.

Ghosh, N. N., Ghosh, S., and Chopra, R. N.

Die Chemische und Pharmakologische Prufung der jungen Sprossen von Bambusa arundinacea. Archiv der pharmazie und Berichte der Deutschen pharmazeutischen Gesellschaft, Band 276, page 351.

Goyal, R. K.

Elimination of tubercle bacilli by various channels in infected laboratory animals. Patna Journal of Medicine, Volume XIII, page 18.

Gupta, A.

Some experiments and observations on leucoderma. Calcutta Medical Journal, March 1938.

Effect of sunlight on healthy and diseased skin. Calcutta Municipal Gazette, 9th Health Number, 1938.

Hameed, M. A.

Agglutination reaction in typhoid fever. (All-India Medical Journal, April 1938).

Lahiri, J. K., Ghosh, S., and Chopra, R. N.

Herstellung von reinem Thevetin aus dem Samen von Thevetia neriifolia, Tuss. Archiv der Pharmazie und Berichte der Deutschen Pharmazeutischen Gesellschaft. Band 76, page 346.

Lal, R. B.

Further studies in epidemic dropsy. Cal. Medl. Jour. Volume 34, September 1938.

Presidential address to the Vital Statistics Section of the All-India Population Conference, Bombay, 1938

Lal, R. B., Swaroop, S., Bhattacharjee, J. K.

Population Survey of sixteen villages in Southern Bengal. Indian Jour. Econ. October, 1938.

Mangalik, V. S.

Idiopathic hypochromic anaemia. Journal of the Indian Medical Association, Volume VIII, November 1938.

Manohar, K. D.

An aneurysm of a coronary artery. Archives of Pathology, December 1938, Volume 26.

Sub-clinical septic fosi. Medical Bulletin, November 1938.

Maplestone, P. A.

Some worm infections : how to avoid them. Calcutta Municipal Gazette, 9th Health Number, page 36.

Clonorchiasis. British Encyclopaedia of Medical Practice, Volume III, page 248, (Butterworth & Co., Ltd., London).

Fluke infections, intestinal. Section 2. British Encyclopaedia of Medical Practice, Volume V, page 320. (Butterworth & Co., Ltd., London).

Paragonimiasis. British Encyclopaedia of Medical Practice, Volume IX, page 401. (Butterworth & Co., Ltd., London).

Mehta, C. R.

The constitution of oroxylin-A, Part II. Journal of the Chemical Society, England, 1938.

Mulligan, H. W., and Afridi, M. K.

Prevention of malaria incidental to engineering construction. Health Bulletin No. 25, Malaria Bureau No. 12.

Napier, L. E.

Anahaemin in tropical macrocytic anaemia. Lancet, Volume II, page 160.

The treatment of malaria, with special reference to the place of atebrin. Transactions of the Medical College Re-Union, Ninth Session, Volume I, page 32.

Kala-Azar. British Encyclopaedia of Medical Practice, Volume VII, page 330. (Butterworth & Co., Ltd., London).

Leishmaniasis cutaneous, Sections 1 and 2. British Encyclopaedia of Medical Practice, Volume VII, page 664. (Butterworth & Co., Ltd., London).

Puri, I. M.

Synoptic tables for the identification of the full-grown larvae of the Indian anopheline mosquitoes. Health Bulletin No. 16, Malaria Bureau No. 7, 3rd edition.

Rao, S.

Treatment of filarial lymphangitis. Proceedings of the Indian Science Congress, Part III, page 232.

Effect of malarial toxin on filarial infection. Proceedings of the Indian Science Congress, Part III, page 232.

Distribution of filarial infection in Calcutta. Proceedings of Indian Science Congress, Part III, Page 240.

Blood changes in filarial infection. Proceedings of Indian Science Congress, Part III, page 240.

Filarial infection and filarial diseases. Health Number, Calcutta Municipal Gazette, 9th Health Number, page 49.

Recent researches on surgical complications in filariasis. Science and Culture, Volume IV, page 183.

Rudra, M. N.

Studies in vitamin C. Part V. The vitamin C content of some germinated cereals and pulses. Journal of the Indian Chemical Society, 15, 191, 1938.

Nutrition : The problem of India. Indian Medical Journal, 32, 1938.

Sen, P. K.

Relapse in cases of pulmonary tuberculosis. Trans. Med. Coll. Re-Union, 10th Session, Dec. 1938.

Industry and tuberculosis. " Science and Culture ", Volume IV, No. 2, August 1938.

After-care of tuberculous outpatients. Trans. Med. Coll. Re-Union, Volume I, No. 1, pp. 106-110, 1938.

Marriage and tuberculosis. Jour. Tuberc. Assoc., Bengal, June 1938.

Sharif, M.

Medical and veterinary importance of fleas and ticks and the possibilities of their control. Current Science, VII, 1938, pp. 11-15.

A proposal to advance the teaching and research in entomology in India. Journ. Bomb. Nat. Hist. Soc., XL, 1938, pp. 508-512.

Diseases transmitted by the Indian species of ticks and possibility of their prevention through biological control. Ind. Journ. Vet. Sci., Anim. Husb., VIII, 1938, pp. 353-366.

Shortt, H. E.

Les maladies Du Genre Typhus Dans L' ' Inde. (Bulletin de l' Office International d'Hygiene Publique. Tome, XXIX, Fascicule 11, pp. 2314-2327).

Sinton, J. A.

Suggestions with regard to the prevention of the spread of yellow fever to India by air traffic, with special reference to insect transmission. Health Bulletin No. 20, 2nd edition.

Sinton, J. A., and Raja Ram.

Man-made malaria in India. Health Bulletin No. 22, Malaria Bureau No. 10, 2nd edition.

Strickland, C.

Holland and Bengal—Reclamation and malaria in two countries. Transactions of the Royal Society of Tropical Medicine and Hygiene, Volume XXXII, page 277.

Swaroop, S., and Lal, R. B.

Logistic law of growth and structure of Indian population. Population, August 1938.

Swaroop, S.

Tables of the exact probabilities for testing the significance of difference between proportions based on pairs of small samples. Sankhya, December, 1938.

Taylor, J.

Nouvelles Observations sur la Valeur de l'agglutination 'O' pour le Diagnostic due Vibrion cholerique. (Bulletin Mensuel de l'Office International d'Hygiene Publique, Tome 30, July 1938, fasc. 7, page 1442).

Note sur l'Epidemie Cholerique de Celebes. (Bulletin Mensuel de l'Office International d'Hygiene Publique, Tome 30, November 1938, fasc. 11, page 2550).

Ukil, A. C.

Tuberculosis in India. "Science and Culture", Volume IV, No. 5, 1938 and Bull. Office International d'Hygiene Publique, Tome XXX, No. 9, September, 1938, page 2066.

Some points in the diagnosis of pulmonary tuberculosis (adult type). Trans. Med. Coll. Re-Union, Volume I, No. 1, 1938, pp. 95-99.

Tuberculosis among "home contacts". Proc. Indian Sc. Congr. 1938, page 250.

Ukil, A. C., and De., K. N.

The applicability of collapse therapy at the Outpatients' Section of a city hospital. Proc. Indian Sc. Congr., 1938, page 233.

Ukil, A. C., and Guha Thakurta, S. R.

The influence of sunlight upon experimental tuberculosis. Amer. Rev. Tuberc., April, 1938.

A tuberculin survey in a hill area in the Darjeeling district. Proc. Indian Sc. Congr. 1938, page 250.

Appendix VIII

relating to

Section IX.

Table showing Sickness and Mortality of all classes

Provinces.	Average daily strength.	Constantly sick.	Influenza. Actuals. A.	Influenza. Actuals. D.	Influenza. Ratios. A.	Influenza. Ratios. D.	Cholera. Actuals. A.	Cholera. Actuals. D.	Cholera. Ratios. A.	Cholera. Ratios. D
India (excluding the Andamans.) *	109,347	21	3,212	10	29	0·1	17	3	0·2	0·03
	116,830	22	3,659	35	31	0·3	11	3	0·1	0·03
	121,821	*23*	*4,426*	*25*	*36*	*0·2*	*15*	*3*	*0·1*	*0 02*
N.-W. F. P.	5,643	23	60	1	11	0·2	...	...	...	...
	6,179	23	50	...	8	...	...	...	...	...
	6,493	*23*	*82*	...	*13*	...	...	...	...	...
Punjab	17,624	18	159	2	9	0·1	1	...	0·06	...
	18,415	23	147	2	8	0·1	...	...	...	...
	19,601	*22*	*148*	*1*	*8*	*0·05*	...	..	...	...
U. P.	28,768	17	433	1	15	0·03	15	3	0·5	0·1
	29,782	18	739	13	25	0·4	7	2	0·2	0·07
	31,552	*20*	*984*	*8*	*31*	*0·3*	*10*	*2*	*0·3*	*0 06*
Bihar	9,036	20	146	...	16	...	...	...	...	...
	9,284	24	245	...	26	...	1	...	0·1	...
	9,833	*23*	*347*	*3*	*35*	*0·3*	*2*	...	*0·2*	...
Orissa	1,076	20	24	...	22	...	...	...	...	...
	1,096	25	9	1	8	0·9	...	...	...	...
	982	*24*	*20*	...	*20*	...	...	...	...	...
Bengal	16,992	38	1,803	3	106	0·2	...	...	...	...
	19,387	37	1,968	8	102	0·4	1	...	0·05	...
	19,200	*38*	*2,072*	*6*	*108*	*0·3*	*2*	...	*0·1*	...
C. P.	3,996	15	111	...	28	...	...	...	...	...
	4,384	9	151	11	34	2·5	...	...	...	...
	4,422	*9*	*133*	*3*	*30*	*0·7*	...	...	...	...
Bombay	6,926	18	88	...	13	...	...	...	...	...
	7,250	17	52	...	7	...	2	1	0·3	0·1
	8,087	*20*	*84*	...	*10*	...	...	...	...	...
Sind	3,722	21	...	...	...	...	1	...	0·3	...
	3,803	24	1	...	0·3	...	...	...	...	...
	3,826	*23*	*8*	...	*2*	...	...	...	...	...
Madras	10,255	14	187	...	18	...	...	...	...	...
	11,710	15	192	...	16	...	...	...	...	...
	11,917	*16*	*412*	*2*	*35*	*0·2*	...	...	...	...
Assam	3,304	24	102	2	31	0·6	...	...	...	...
	3,566	22	79	...	22	...	...	...	...	..
	3,882	*23*	*105*	*1*	*27*	*0·3*	...	...	...	...

*The sickness and mortality figures relating to the Andamans have been dealt with in paragraph 90 of this report.

A.—Admissions; D.—Deaths.

OF PRISONERS IN DISTRICT AND CENTRAL JAILS IN INDIA.

Smallpox.				Enteric fever.				Malaria.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
25	1	0·2	0·01	301	26	3	0·2	12,383	24	113	0·2
33	2	0·3	0·02	236	30	2	0·3	14,205	44	122	0·4
49	*3*	*0·4*	*0·02*	*248*	*33*	*2*	*0·3*	*19,598*	*63*	*161*	*0·5*
3	...	0·5	...	28	1	5	0·2	607	2	108	0·4
2	...	0·3	...	32	8	5	1·3	787	2	127	0·3
1	...	*0·2*	...	*34*	*4*	*5*	*0·6*	*1,114*	*4*	*172*	*0·6*
4	...	0·2	...	68	3	4	0·2	1,607	1	91	0·06
6	...	0·3	...	66	4	4	0·2	2,383	7	129	0·4
5	...	*0·3*	...	*64*	*7*	*3*	*0·4*	*4,354*	*13*	*222*	*0·7*
14	...	0·5	...	51	3	2	0.3	3,396	2	118	0·1
9	1	0·3	0·03	33	3	1	0·1	3,723	5	125	0·2
21	*1*	*0·7*	*0·03*	*32*	*2*	*1*	*0·06*	*4,544*	*7*	*144*	*0·2*
1	1	0·1	0·1	51	4	6	0·4	436	3	48	0·3
...	...	...	...	29	3	3	0·3	500	3	54	0·3
2	...	0·2	...	*26*	*4*	*3*	*0·4*	*505*	*5*	*51*	*0·5*
...	...	...	...	2	...	2	...	56	...	52	...
...	...	...	...	...	...	...	...	33	...	30	...
...	...	...	...	...	...	...	...	*74*	...	*75*	...
2	...	0·2	...	40	4	2	0·2	3,418	10	201	0·6
10	1	0·6	0·05	21	6	1	0·3	3,835	17	198	0·9
13	*1*	*0·7*	*0·05*	*24*	*5*	*1*	*0·3*	*4,788*	*20*	*249*	*1·0*
...	...	...	...	3	1	0·8	0·3	335	...	84	...
...	...	...	...	1	1	0·2	0·2	230	1	52	0·2
1	...	*0·2*	...	*3*	...	*0·7*	...	*195*	*2*	*44*	*0·5*
...	...	...	...	14	1	2	0·1	930	2	134	0·3
...	...	...	...	22	1	3	0·1	841	3	116	0·4
...	...	...	...	*15*	*2*	*2*	*0·2*	*1,599*	*2*	*198*	*0·2*
2	...	...	...	19	2	5	0·5	1,015	1	273	0·3
1	...	0·5	...	22	3	6	0·8	1,110	...	292	...
...	...	*0·3*	...	*16*	*3*	*4*	*0·8*	*1,285*	*2*	*336*	*0·5*
2	...	...	...	12	1	1	0·1	198	2	19	0·2
1	...	0·2	...	3	...	0·8	...	218	4	18	0·3
...	...	*0·08*	...	*16*	*2*	*1*	*0·2*	*240*	*3*	*20*	*0·2*
2	...	...	...	10	...	3	...	203	1	61	0·3
...	...	0·6	...	1	1	0·8	0·3	271	...	76	...
...	...	...	...	*7*	*1*	*2*	*0·3*	*420*	*3*	*103*	*0·3*

NOTE.—The three figures against each administrative group are those for (1) 1938, (2) 1937 and (3) 1933-37
The rates have been calculated *per mille* of the average strength.

TABLE SHOWING SICKNESS

Provinces.	Average daily strength.	Constantly sick.	Pyrexia of uncertain origin.				Tubercle of the lungs.			
			Actuals.		Ratios.		Actuals.		Ratios.	
			A.	D.	A.	D.	A.	D.	A.	D.
India (excluding the Andamans*).	109,347	21	1,099	2	10	0·02	716	177	7	1·6
	116,830	22	922	4	8	0·03	588	208	5	1·8
	121,321	*23*	*939*	*5*	*8*	*0·04*	*702*	*234*	*6*	*1·9*
N.-W. F. P.	5,643	23	15	...	3	...	58	12	10	1·1
	6,179	23	40	...	6	...	57	21	9	3·4
	6,493	*28*	*26*	...	*4*	..	*57*	*20*	*9*	*3·1*
Punjab	17,624	18	201	2	11	0·1	134	29	8	1·6
	18,415	23	220	...	12	...	77	18	4	1·0
	19,601	*22*	*258*	*2*	*13*	*0·1*	*167*	*48*	*9*	*2·4*
U. P.	28,768	17	219	..	8	..	137	28	5	1·0
	29,782	18	155	1	5	0·03	107	39	4	1·8
	31,552	*20*	*270*	..	*9*	..	*105*	*36*	*3*	*1·1*
Bihar	9,036	20	59	...	7	...	78	20	9	2·2
	9,284	24	5	...	1	...	70	37	8	4·0
	9,833	*23*	*11*	...	*1*	...	*73*	*36*	*7*	*3·7*
Orissa	1,076	20	...	...	...	...	...	2	...	1·9
	1,096	25	...	...	...	...	12	3	11	2·7
	982	*24*	...	...	..	...	*5*	*2*	*5*	*2·0*
Bengal	16,992	38	463	...	27	...	132	35	8	2.1
	19,387	37	392	...	15	...	100	29	5	1·5
	19,200	*38*	*290*	...	*15*	...	*108*	*32*	*6*	*1·7*
C. P.	3,996	15	20	...	5	..	19	4	5	1·0
	4,384	9	34	2	8	0·5	19	6	4	1·4
	4,422	*9*	*37*	*1*	*8*	*0·2*	*22*	*7*	*5*	*1·6*
Bombay	6,926	18	7	...	1	...	25	9	4	1·3
	7,250	17	7	...	1	...	25	12	3	1·7
	8,087	*20*	*8*	...	*1*	...	*30*	*14*	*4*	*1·7*
Sind	3,722	21	18	...	5	...	21	8	6	2·1
	3,803	24	4	...	1	...	19	8	5	2·1
	3,826	*23*	*4*	...	*1*	...	*14*	*6*	*4*	*1·6*
Madras	10,255	14	70	...	7	...	64	16	6	1·6
	11,710	15	27	1	2	0·1	64	23	5	2·0
	11,917	*16*	*15*	...	*1*	...	*72*	*19*	*6*	*1·6*
Assam	3,304	24	13	...	4	...	39	12	12	3·6
	3,566	22	6	...	2	...	32	10	9	2·8
	3,882	*23*	*7*	...	*2*	...	*40*	*10*	*10*	*2·6*

*The sickness and mortality figures relating to the Andamans have been dealt with in paragraph 90 of this report.

A.—Admissions; D.—Deaths.

AND MORTALITY—*contd.*

Pneumonia.				Other respiratory diseases.				Dysentery.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
933	195	9	1·8	3,229	53	30	0·5	3,999	81	37	0·7
1,127	236	10	2·0	3,764	42	32	0·4	3,533	92	30	0·8
1,324	*284*	*11*	*2·3*	*3,823*	*50*	*31*	*0·4*	*4,244*	*95*	*35*	*0·8*
63	15	11	2·7	121	...	21	...	25	..	4	..
101	16	16	2·6	235	2	38	0·3	27	4	4	0·6
132	*24*	*20*	*3·7*	*303*	*2*	*47*	*0·3*	*59*	*2*	*9*	*0·3*
130	22	7	1·2	769	2	44	0·1	67	1	4	0·06
141	27	8	1·5	762	4	41	0·2	70	...	4	...
185	*41*	*9*	*2·1*	*789*	*5*	*40*	*0·3*	*382*	*9*	*19*	*0·5*
233	50	8	1·7	687	22	24	0·8	512	7	18	0·2
252	61	8	2·0	896	11	30	0·4	447	4	15	0·1
271	*64*	*9*	*2·0*	*823*	*13*	*26*	*0·4*	*438*	*7*	*14*	*0·2*
74	13	8	1·4	245	4	27	0·4	480	16	53	1·8
84	20	9	2·1	265	2	29	0·2	435	17	47	1·8
123	*27*	*13*	*2·7*	*324*	*5*	*33*	*0·5*	*514*	*15*	*52*	*1·5*
4	1	4	0·9	18	1	17	0·9	30	2	28	1·9
4	2	4	1·8	17	...	15	...	41	1	37	0·9
10	*3*	*10*	*3·1*	*20*	...	*20*	...	*39*	*2*	*40*	*2·0*
138	28	8	1·7	634	7	37	0·4	1,498	22	88	1·3
240	43	12	2·2	728	9	38	0·5	1,176	33	61	1·7
237	*50*	*12*	*2·6*	*751*	*8*	*39*	*0·4*	*1,268*	*27*	*66*	*1·4*
50	15	13	4·0	35	7	9	1·8	428	8	107	2·0
33	9	8	2·1	41	1	9	0·2	102	7	23	1·6
37	*11*	*8*	*2·5*	*48*	*3*	*11*	*0·7*	*131*	*5*	*30*	*1·1*
32	5	5	0·7	150	1	22	0·1	177	3	26	0·4
36	11	5	1·5	119	3	16	0·4	254	3	35	0·4
49	*8*	*6*	*1·0*	*177*	*2*	*22*	*0·2*	*227*	*2*	*28*	*0·2*
104	17	28	4·6	172	..	46	...	147	3	39	0·8
89	16	23	4·2	181	1	47	0·3	268	1	70	0·3
116	*22*	*30*	*5·8*	*185*	*2*	*48*	*0·5*	*294*	*3*	*77*	*0·8*
44	11	4	1·1	143	4	14	0·4	289	6	28	0·6
66	18	6	1·5	183	4	15	0·2	264	7	23	0·6
62	*13*	*5*	*1·1*	*128*	*6*	*11*	*0·5*	*416*	*12*	*35*	*1·0*
47	12	14	3·6	135	...	41	...	315	13	95	3·9
57	10	16	2·8	172	3	48	0·8	351	14	98	3·9
71	*15*	*18*	*3·9*	*191*	*2*	*49*	*0·5*	*400*	*10*	*103*	*2·6*

Note.—The three figures against each administrative group are those for (1) 1938, (2) 1937 and (3) 1933-37. The rates have been calculated *per mille* of the average strength.

TABLE SHOWING SICKNESS

Provinces.	Average daily strength.	Constantly sick.	Diarrhœa. Actuals. A.	Actuals. D.	Ratios. A.	Ratios. D.
India (excluding the Andamans*).	109,347	21	1,824	17	17	0·2
	116,830	22	1,950	21	17	0·2
	121,821	*23*	*2,524*	*23*	*21*	*0·2*
N.-W. F. P.	5,643	23	34	1	6	0·2
	6,179	23	18	1	3	0 2
	6,493	*28*	*34*	*1*	*5*	*0·2*
Punjab	17,624	18	140	...	8	...
	18,415	23	170	3	9	0·2
	19,601	*22*	*259*	*6*	*13*	*0·3*
U. P.	28,768	17	420	6	15	0·2
	29,782	18	354	5	12	0·2
	31,552	*20*	*392*	*5*	*12*	*0·2*
Bihar	9,036	20	108	1	12	0·1
	9,284	24	121	...	13	...
	9,833	*23*	*208*	...	*21*	...
Orissa	1,076	20	17	...	16	...
	1,096	25	30	...	27	...
	982	*24*	*32*	...	*33*	...
Bengal	16,992	38	644	6	38	0·4
	19,387	37	858	3	44	0·1
	19,200	*38*	*1,111*	*2*	*58*	*0·1*
C. P.	3,996	15	41	2	10	0·5
	4,384	9	34	2	8	0·5
	4,422	*9*	*72*	*2*	*16*	*0·5*
Bombay	6,926	18	169	...	24	...
	7,250	17	165	2	23	0·3
	8,087	*20*	*202*	...	*25*	...
Sind	3,722	21	183	...	49	...
	3,803	24	134	2	35	0·5
	3,826	*23*	*115*	*2*	*30*	*0·5*
Madras	10,255	14	31	...	3	...
	11,710	15	28	2	2	0·2
	11,917	*16*	*27*	*2*	*2*	*0·2*
Assam	3,304	24	13	1	4	0·3
	3,566	22	8	...	2	...
	3,882	*23*	*41*	...	*11*	...

*The sickness and mortality figures relating to the Andamans have been dealt with in paragraph 90 of this report.

A.—Admissions; D.—Deaths.

AND MORTALITY—*concld.*

Anæmia and Debility.				All Causes.			
Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.
912	33	8	0·3	52,328	1,002	479	9
922	32	8	0·3	57,570	1,226	493	10
1,014	*38*	*8*	*0·3*	*68,380*	*1,383*	*561*	*11*
32	...	6	...	2,123	44	376	8
19	...	3	...	2,468	78	399	13
36	...	*6*	...	*3,229*	*78*	*497*	*12*
83	1	5	0·06	7,678	105	436	6
116	4	6	0·2	8,693	179	472	9
131	*4*	*7*	*0·2*	*12,292*	*235*	*627*	*12*
164	5	6	0·2	12,338	203	429	7
182	3	6	0·1	13,489	228	453	8
176	*4*	*6*	*0·1*	*15,068*	*239*	*478*	*8*
14	2	15	0·2	2,801	95	310	11
13	1	2	0·1	3,145	117	339	13
20	*2*	*2*	*0·2*	*3,636*	*159*	*370*	*16*
11	...	10	...	310	18	288	17
13	...	20	...	343	9	313	8
8	...	*8*	...	*408*	*14*	*415*	*14*
324	8	19	0·5	15,294	179	900	11
310	5	16	0·2	17,039	226	879	12
353	*9*	*18*	*0·5*	*19,274*	*235*	*1,004*	*12*
45	4	11	1·0	1,417	84	355	21
27	4	6	0·9	990	75	226	17
25	*3*	*6*	*0·7*	*1,099*	*63*	*249*	*14*
104	2	15	0·3	3,075	55	444	8
75	4	10	0·6	2,851	72	393	10
77	*3*	*10*	*0·4*	*4,458*	*71*	*551*	*9*
37	1	10	0·3	2,637	53	705	14
46	...	12	...	2,851	56	750	15
27	*1*	*7*	*0·3*	*2,762*	*68*	*722*	*18*
44	3	4	0·3	2,396	79	234	8
69	5	6	0·4	2,414	118	206	10
86	*5*	*7*	*0·4*	*2,863*	*129*	*240*	*11*
39	6	12	1·8	1,155	64	350	19
34	4	10	1·1	1,411	55	396	15
61	*6*	*16*	*1·5*	*1,869*	*63*	*481*	*16*

NOTE.—The three figures against each administrative group are those for (1) 1938, (2) 1937 and (3) 1936-37. The rates have been calculated *per mille* of the average strength.

GIPD—M 481 PHC—18·12·40—1,200.

HC. 2. 39
1150

ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1939

With Appendices

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI.
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI
1941

Price Rs. 2 or 3s.

List of Agents in India and Burma from whom Government of India Publications are available

ABBOTTABAD.—English Book Store.

AGRA—
English Book Depot, Taj Road.
Indian Army Book Depot, Dayalbagh.

AHMEDABAD.—H. L. College of Commerce Co-operative Store, Ltd.

AJMER.—Banthiya & Co., Ltd., Station Road.

AKOLA.—Bakshi, Mr. M. G.

ALLAHABAD—
Central Book Depot, 44, Johnstonganj.
Kitabistan, 17-A, City Road.
Ram Narain Lal, 1, Bank Road.
Superintendent, Printing and Stationery, U. P.
Wheeler & Co., Messrs. A. H.

BOMBAY—
Co-operator's Book Depot, 9, Bakehouse Lane, Fort.
International Book House, Ash Lane, Esplanade Road.
Joshi, Mr. V. G., News Agent, Devgad Baria, *Via* Piplod.
Kothari Book Depot.
Lakhani Book Depot, Bombay, 4.
New Book Co., Kitab Mahal, 188-90, Hornby Road.
Popular Book Depot, Grant Road.
Superintendent, Govt. Printing & Stationery, Queen's Road.
Taraporevala Sons & Co., Messrs. D. B.
Thacker & Co., Ltd.
Tripathi & Co., Messrs. N. M., Princess Street, Kalbadevi Road.
Wheeler & Co., Messrs. A. H.

CALCUTTA—
Book Company.
Chatterjee & Co., 3, Bacharam Chatterjee Lane.
Chukervertty, Chatterjee & Co., Ltd., 13, College Square.
Das Gupta & Co., 54/3, College Street.
Hindu Library, 137-F, Balaram De Street.
Lahiri & Co., Ltd., Messrs. S. K.
Macmillan & Co., Ltd., 294, Bow Bazar Street.
Newman & Co., Ltd., Messrs. W.
Roy Chowdhury & Co., Messrs. N. M., 72, Harrison Road.
Sarcar & Sons, Messrs. M. C., 15, College Square.
Sarkar & Sons, Ltd., Messrs. S. C., 1/1/1-C., College Square.
Standard Law Book Society, 79/1, Harrison Road.
Thacker, Spink & Co. (1933), Ltd.
Wheeler & Co., Messrs. A. H.

CAWNPORE—
Advani & Co., P. O. Box No. 100.
Indian Army Depot, Juhi.

CUTTACK.—Press Officer, Orissa Secretariat.

DEHRA DUN—
Jugal Kishore & Co.
Ideal Book Depot, Rajpur Road.

DELHI—
Imperial Book Depot and Press, Near Jama Masjid (Machhliwalan).
Income-tax Law Publishing House, Chandni Chowk.*
Indian Army Book Depot, Daryaganj.
Jaina & Bros., Messrs. J. M., Morigate.
Oxford Book and Stationery Co.
Sharda Mandir, Ltd., Nai Sarak.
Young Man & Co. (Regd.), Egerton Road.

DUM DUM CANTT.—Bengal Flying Club.†

FEROZEPUR.—English Book Depot.

GWALIOR.—Jain & Bros., Messrs. M. B., Sarafa Road.

HYDERABAD (DECCAN).—Hyderabad Book Depot, Chaderghat.

JAIPUR.—Garg Book Co., Tripolia Bazar.

KARACHI—
Aero Stores.
English Bookstall.
Standard Bookstall.

KARACHI (SADAR).—Manager, Sind Government Book Depot and Record Office.

LAHORE—
Kansil & Co., Messrs. N. C., 9, Commercial Buildings, The Mall.
Malhotra & Co., Messrs. U. P., Post Box No. 94.
Minerva Book Shop, Anarkali Street.
Punjab Religious Book Society.
Rama Krishna & Sons, Anarkali.
Superintendent, Govt. Printing, Punjab.
University Book Agency, Kacheri Road.

LUCKNOW.—Upper India Publishing House, Ltd., Literature Palace, Aminuddaula Park.

LYALLPORE.—Lyall Book Depot.

MADRAS—
Higginbothams.
Superintendent, Govt. Press, Mount Road.
Varadachary & Co., Messrs. P.

MHOW.—British Book Depot.

MOGA.—Army Musketry Stores.

NAGPUR—
Khot & Sons, Messrs. G. G. Sita Burdi, 3rd Modi Lane.
Superintendent, Govt. Printing, Central Provinces.

NEGAPATAM.—Venkataraman, Mr. B.

NEW DELHI—
Bawa Harkishen Das Bedi, Ferozeshah Road.
Bhawnani & Sons.
Delhi and U. P. Flying Club., Ltd.†
Jaina & Bros., Messrs. J. M., Connaught Place.
Ramesh Book Depot & Stationery Mart, Connaught Place.
Saraswati Book Depot, 15, Lady Hardinge Road.

PATNA.—Superintendent, Government Printing, Bihar, P. O Gulzarbagh.

PATNA CITY.—
Lakshmi Trading Co., Padri-ki-Haveli.
Raghunath Prasad & Sons.
Sinha & Bros., Messrs. R. P., Guzri Bazar.

PESHAWAR—
British Stationery Mart.
London Book Co. (India), Arbab Road.
Manager, Govt. Printing & Stationery, N.-W. F. P.

PESHAWAR CANTT.—Faqir Chand Marwah.

POONA—
Deccan Bookstall, Fergusson College Road.
Dastane Bros., Home Service, 456, Rawiwar Peth.
International Book Service.
Ram Krishna Bros., opposite Bishram Bagh.

QUETTA.—Standard Bookstall.

RAJKOT.—Mohanlal Dossabhai Shah.

RANGOON—
Burma Book Club, Ltd.
Curator, Govt. Book Depot, Burma.

RAWALPINDI.—Ray & Sons, Messrs. J., 43, K. & L. Edwardes Road.

SHILLONG.—Superintendent, Assam Secretariat Press.

SIALKOT CANTT.—Modern Book Depot, Bazar Road.

SIALKOT CITY—
Buckingham & Co., Booksellers & Stationers, Greenwood Street.
Clifton & Co.

TRICHINOPOLY FORT.—Krishnaswami & Co., Messrs. S., Teppakulam.

TRIVANDRUM.—
Booklovers' Resort, Taikad.
P. R. Bros., Main Road.

VELLORE.—Venkatasubban, Mr. A., Law Bookseller.

---

* Agents for Income-tax, Law and allied Publications only. † Agents for Publications on Aviation only.

28/19-41

ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1939

ROY. LIBRARY OF THE BOMBAY BRANCH OF THE R.A.S. SOCIETY

With Appendices

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI.
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI.
1941.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1939

TABLE OF CONTENTS.

SECTION I.

ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1939.

PARA.		PAGE
1.	Introduction	1
2.	Population	2
3.	Live-births and deaths	3
4.	Infantile mortality	6
5.	Mortality among children	7
6.	Still-births	8
7.	Rainfall	8
8.	Agricultural conditions	9
9.	Famine relief	10
10.	Indian States	11

SECTION II

MATERNITY AND CHILD WELFARE.

11.	Introduction	12
12.	Maternal mortality	12
13.	Provision for maternity and child welfare work	17

SECTION III

VACCINATION AGAINST SMALLPOX.

14.	Vaccination and revaccination statistics	20
15.	Vaccine institutes and supply of vaccine	25
16.	Indian States	25

SECTION IV

PUBLIC HEALTH WORKS.

17.	General	27
18.	North-West Frontier Province	27
19.	Punjab	27
20.	United Provinces	28
21.	Bihar	28
22.	Orissa	29
23.	Bengal	29
24.	Central Provinces	29
25.	Bombay	30
26.	Sind	30
27.	Madras	30
28.	Assam	32

SECTION V

HEALTH OF JAILS IN INDIA.

PARA.		PAGE
29.	General	33
30.	Jails of all classes	33
31.	District and central jails	37
32.	Reforms	38
33.	Andamans	38
34.	Conclusions	40

Appendices I to VIII (see details on page 41 *et seq.*)

LIST OF ILLUSTRATIONS

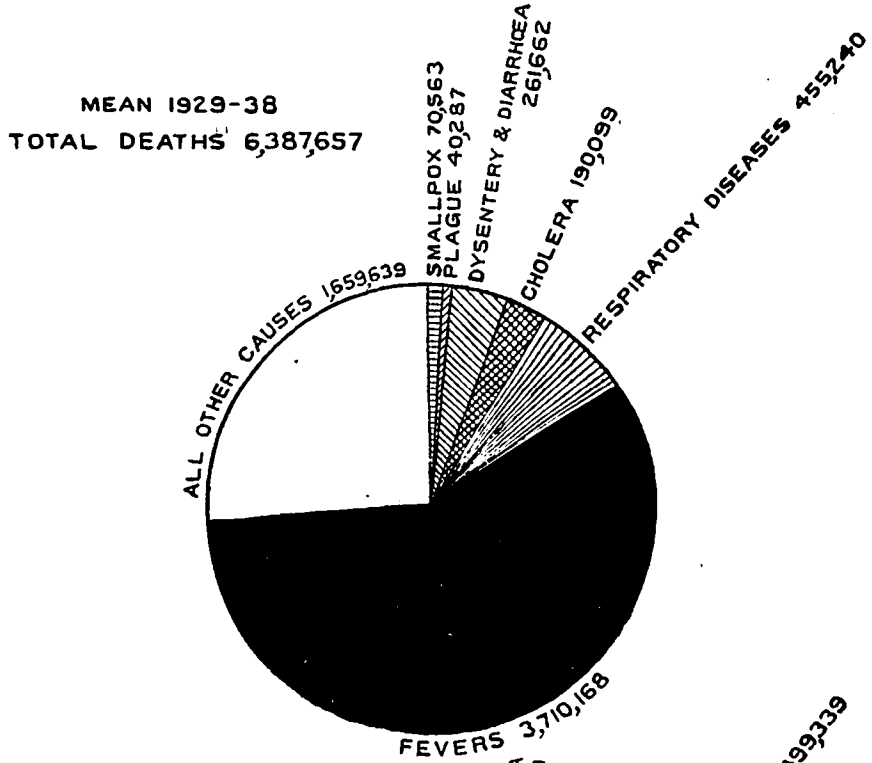
	FACING PAGE
Key map of India	1
Comparative diagrams of deaths by causes in British India during 1939 and the decennial mean 1929-38	1

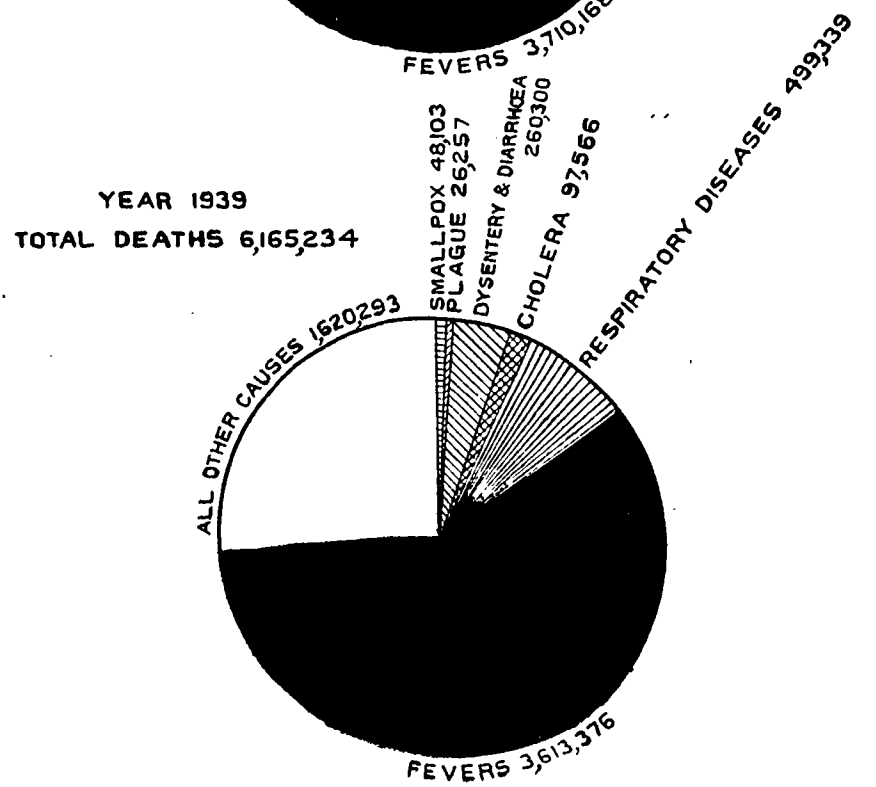
With the compliments of Lieutenant-Colonel E. Cotter, I.M.S., Public Health Commissioner with the Government of India.

New Delhi, India.

KEY
MAP OF INDIA
(SHOWING PROVINCES AND DISTRICTS)
REFERENCE
REFERENCES
REFERENCES
Scale 1 Inch = 100 Miles.
KASHMIR & JAMMU
BHUTAN
BENGAL
BURMA
BAY
OF
BENGAL
ARABIAN SEA
LACCADIVE ISLANDS
ANDAMAN ISLANDS
PONDICHERRY
KARIKAL
MADRAS
CEYLON
Published with the permission of the Surveyor General of India.

BRITISH INDIA
COMPARATIVE DIAGRAMS OF DEATHS BY CAUSES





Annual Report of the Public Health Commissioner with the Government of India for 1939

SECTION I.

ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1939.

Introduction.

1. In June 1940 a Preliminary Annual Report of the Public Health Commissioner for 1939 was published in order to meet the general desire on the part of the authorities and of the public for a review of the health conditions in India as early as possible after the close of the year. The survey of public health activities in that report was confined to an account of the general trend of events without any detailed discussion supported by relevant statistics, since the necessary figures were not available soon after the close of the year. Further, certain subjects such as maternity and child welfare, vaccination against smallpox, public health works, and jail health administration were not included in the preliminary report. Brief accounts of the activities under these heads have therefore been incorporated in this report, which is intended to supplement the information already given in the Preliminary Annual Report. The two reports should therefore be read in conjunction.

The main vital statistics for British India for 1939 are summarised below. The figures for 1938 and the corresponding averages for the previous quinquennium (1934-38) are also given for comparison.

	1939.	1938.	Average of 1934-38.
Mid-year estimated population	278,308,876	275,540,813	269,156,840
Density per square mile	365	361	351
Births — Number	9,346,145	9,398,011	9,315,007
Births — Rate *per mille*	33·6	34·1	34·6
Deaths — Number	6,165,234	6,685,120	6,369,425
Deaths — Rate *per mille*	22·2	24·3	23·7
Infantile death rate per 1,000 live-births	155·6	167·1	167·4
Vital index	151·6	140·6	146·2

The figures of the above table and a comparison of the two diagrams facing this page, which classify deaths under certain groups of causes, give some indication of the health of the population during the year under review. The table shows that both the general and infantile death rates were smaller in 1939 than those for 1938 and the corresponding average rates for the previous quinquennium. The diagrams show that, in regard to the mortality from the three widely prevalent epidemic diseases smallpox, plague and cholera, the figures for 1939 were only 68, 65 and 51 per cent respectively of the average numbers of deaths from these diseases during the previous ten years.

Malaria continues to be the most important public health problem in India. Although absence of medical certification makes it impossible to secure correct figures regarding the incidence of the disease, all the available evidence seems to suggest that malaria is responsible for more deaths than any other infectious disease prevalent in the country.

Population.

2. The birth rate during 1939 was slightly smaller than that for 1938 but there was a reduction in the death rate also, the net increase in population being in the neighbourhood of 2,800,000. The two tables given below provide interesting information regarding the growth of population in British India. The first table covers a period of nearly seventy years, 1871-1939, and from an examination of the decennial averages for excess of births over deaths and of the corresponding annual figures since 1931, it will be seen that the tendency has been for the rate of growth to rise steadily. The fluctuations in the birth rate since the beginning of the present century appear to have been negligible but recent years have witnessed a decline in the death rate which has been responsible for this growth of population. It is not perhaps unreasonable to assume that the expansion of health services in many parts of the country during the past two decades has contributed its share to this reduction in mortality.

The second table provides an interprovincial comparison of the rates of growth during a period of nearly eight years and four months since the 1931 census. Wide differences exist between the different provincial rates of growth. Coorg recorded the minimum rate of 0·53 per cent and the Punjab the highest, 15·68 per cent. Owing to the creation in 1936 of the province of Orissa from territories belonging to the provinces of Madras, the Central Provinces and Bihar and Orissa and the separation of Sind from Bombay Presidency, it has not been possible to give separate rates of growth for these different provinces.

TABLE I (*i*).

	Annual number of births.	Birth rate *per mille*.	Annual number of deaths.	Death rate *per mille*.	Annual excess of births over deaths.
1871—1880	Not available	Not available	3,540,202	19	Not available
1881—1890	4,565,687	23	5,058,578	26	492,891
1891—1900	7,174,694	33	6,662,417	31	512,277
1901—1910	8,591,136	37	7,657,513	33	933,623
1911—1920	8,810,018	37	8,142,364	34	667,654
1921—1930	8,345,364	33	6,347,063	25	1,995,301
1931	8,814,836	35	6,404,990	25	2,409,846
1932	8,718,620	34	5,596,246	22	3,122,374
1933	9,317,918	36	5,870,336	23	3,447,582
1934	8,923,169	34	6,606,697	25	2,316,472
1935	9,299,021	35	6,331,576	24	2,967,445
1936	9,566,379	36	6,111,358	23	3,455,021
1937	9,388,457	35	6,112,375	22	3,276,082
1938	9,398,011	34	6,685,120	24	2,712,891
1939	**9,346,145**	**34**	**6,165,234**	**22**	**3,180,911**

TABLE I (*ii*).

	Estimated population on 30th June 1938.	Estimated population on 30th June 1939.	Percentage increase or decrease.	Total percentage increase from 1st March 1931 (last census) to the end of June 1939.
British India .	**275,540,813**	**278,308,876**	**+1·00**	**9·74**
N.-W. F. P. .	2,539,059	2,562,618	+0·93	8·64
Punjab . .	26,597,656	27,138,533	+2·03	15·68
Delhi . .	715,419	731,870	+2·30	15·03
U. P. . .	52,994,705	53,618,255	+1·18	10·76
Bengal . .	52,583,541	52,798,320	+0·41	5·81
Bombay . .	19,620,735	19,832,832	+1·08	10·65
Sind . .	4,265,564	4,299,306	+0·79	
Bihar . .	35,084,665	35,448,534	+1·04	9·76
Orissa . .	7,251,906	7,290,415	+0·53	
C. P. . .	16,748,481	16,758,046	+0·06	
Madras . .	47,872,410	48,496,423	+1·30	
Coorg . .	164,109	164,187	+0·05	0·53
Assam . .	8,506,974	8,566,451	+0·70	8·07
Ajmer-Merwara	595,589	603,086	+1·26	7·64

Live-births and Deaths.

3. Provincial birth and death rates are given in tables I (*iii*) and I (*iv*) below. The total number of live-births registered in British India during 1939 was 9,346,145, a decrease of a little over 50,000 in comparison with that of the previous year. The figures of the last column of table I (*iii*) bear close resemblance to similar figures given in the previous reports and they tend to confirm the impression that, in certain provinces, female births escape registration to a greater extent than in others.

Another striking feature of these two tables is the difference between individual provinces in respect of the recorded birth and death rates. Sind shows the lowest rate among the provinces for births and deaths and it is almost certain that defective registration is responsible for such low figures. In the provinces of the Punjab, Delhi, Orissa, the Central Provinces, Bombay, Madras and Ajmer-Merwara the recorded birth rate is higher than that for British India while the figure for the United Provinces is practically the same as the rate for the country as a whole. In the remaining provinces it is desirable that the health authorities should investigate whether an appreciable number of births is being omitted from registration. Such an investigation is more particularly required in Coorg, the N.-W. F. Province and Assam.

Urban and rural birth rates for British India and the provinces are given in table C of appendix I. For British India the urban rate during 1939 was 36·8 *per mille* and the rural 33·2 *per mille*. In the provinces the urban rate varied from 18·6 *per mille* in Bihar to 60·9 *per mille* in Coorg. Sind recorded the lowest rural rate, namely, 15·0 *per mille* and Delhi the highest, 45·5 *per mille*.

As regards the death rate the differences between the provincial figures are not so large as in the case of the birth rate. However, Assam and the N.-W. F. Province have recorded relatively low rates and it is desirable that suitable action should be taken by the authorities.

TABLE I (*iii*).

	Births.			Rate *per mille*		No. of males born per 100 females in 1939.
	Male.	Female.	Total.	1939	1938	
British India	**4,865,309**	**4,480,836**	**9,346,145**	**33·6**	**34·1**	**109**
N.-W. F. P.	40,746	30,961	71,707	28	28	132
Punjab	588,531	523,073	1,111,604	41	44	113
Delhi	16,422	15,463	31,885	44	48	106
U. P.	934,192	821,229	1,755,421	33	34	114
Bihar	554,244	523,539	1,077,783	30	32	106
Orissa	127,106	119,902	247,008	34	33	106
Bengal	829,317	768,334	1,597,651	30	29	108
C. P.	326,065	308,843	634,908	38	40	106
Bombay	399,681	375,864	775,545	39	39	106
Sind	45,091	35,855	80,946	19	18	126
Madras	865,144	829,607	1,694,751	35	36	104
Coorg	1,994	1,788	3,782	23	23	112
Assam	125,573	116,855	242,428	28	28	107
Ajmer-Merwara	11,203	9,523	20,726	34	35	118

TABLE I (*iv*).

	Deaths.			Death rate *per mille*.		
	Male.	Female.	Total.	Male.	Female.	Total.
British India	**3,232,250**	**2,932,984**	**6,165,234**	**22·5**	**21·7**	**22·2**
N.-W. F. P.	24,244	20,032	44,276	17·4	17·1	17·3
Punjab	323,204	279,988	603,192	22·0	22·5	22·2
Delhi	8,470	8,430	16,900	20·2	27·0	23·1
U. P.	604,402	513,607	1,118,009	21·5	20·2	20·9
Bihar	395,388	349,377	744,765	22·3	19·7	21·0
Orissa	99,611	99,701	199,312	28·6	26·2	27·3
Bengal	569,534	520,996	1,090,530	20·7	20·6	20·7
C. P.	270,609	244,691	515,300	32·4	29·1	30·7
Bombay	253,113	241,774	494,887	24·6	25·3	25·0
Sind	25,394	19,385	44,779	10·5	10·3	10·4
Madras	563,478	547,803	1,111,281	23·4	22·4	22·9
Coorg	2,014	1,736	3,750	22·2	23·6	22·8
Assam	85,429	78,690	164,119	18·9	19·4	19·2
Ajmer-Merwara	7,360	6,774	14,134	23·0	24·0	23·4

Death rates for rural and urban areas in the provinces during 1939 are given in tables G and H in appendix I. The rural rate was 21·8 *per mille* and that for urban areas was 25·3 *per mille*. The provincial rural rates varied

from 8·8 in Sind to 30·7 in the Central Provinces, and those of urban areas from 12·4 in Bihar to 57·7 in Coorg.

Special mention was made, in last year's report, of the high rates of mortality recorded in the Central Provinces during the past few years and the rate for 1939 (30·7) is again the highest among the provinces. The desirability of urgent attention to this question by the health authorities of the Central Provinces is again emphasised.

A comparison of the death rates of males and females during the age period 15—40 years throws light on the part that the factors associated with child-bearing play on the health of the women. In the more advanced countries of the West, where more adequate provision exists for the safeguarding of the health of mothers, the female death rate at this age period does not exceed that of the male. On the other hand the figures of table I(*v*) show that the recorded mortality rate at this age period among women has been higher than that of males in every province in India, except Bihar.

TABLE I(*v*).

	Deaths, 15—40 years.		Death rates, 15—40 years.	
	Males	Females	Males	Females
British India	550,749	609,625	9·4	10 9
N.-W. F. P.	5,159	5,072	9·3	10·4
Punjab	40,670	43,992	7·0	9·1
Delhi	1,255	1,752	6·1	12·7
U. P.	95,738	98,783	8·2	9·4
Bihar	85,404	77,359	12·2	10·7
Orissa	19,592	23,332	13·4	14·0
Bengal	123,910	144,656	10·8	13·2
C. P.	41,560	43,578	12·3	12·7
Bombay	35,973	43,784	8·3	11·0
Sind	5,579	5,330	5·2	6·5
Madras	76,990	98,134	8·0	9·6
Coorg	686	682	15·2	20·4
Assam	17,304	21,846	9·4	12·8
Ajmer-Merwara	929	1,325	6·9	11·4

Infantile Mortality.

4. Tables I (*vi*), (*vii*) and (*viii*) give figures relating to infant mortality. These figures bear close resemblance to similar data presented in the reports for previous years and, while no new information has therefore been presented, these figures tend to emphasise the importance of certain facts in relation to infant life. Of the total infantile deaths 47·3 per cent took place during the first month of life and, of these neonatal deaths, 61·2 per cent occurred during the first week after birth. The causes associated with death during these two periods relate largely to the uterine life of the infant and preventive work must therefore be on the lines of providing adequate prenatal care to the pregnant woman. In the succeeding months environmental causes begin to play an increasingly important part in affecting the health of the child and hygiene of the home and the various factors that may be summarised in the term "Mothercraft" together determine largely the chance of survival for the infant. The measures that are being adopted for the welfare of mothers and children are briefly discussed in the section on maternity and child welfare (page 17).

Table I (*viii*) gives death rates for male and female infants and it will be seen that the male rate is almost invariably higher than that of the female baby. In table I (*iii*) it was shown that nature provides for more males to be born than female infants and this reduced rate of mortality for the latter appears to be a compensatory mechanism for making the proportions of the two sexes in the community approximate to each other.

TABLE I(*vi*).

	Under one month.		One to six months.		Six to twelve months.		Total deaths under one year.	Death rates per 1,000 live-births.	
	Number.	% of total.	Number.	% of total.	Number.	% of total.		1939.	1938.
British India .	687,880	47·3	441,166	30·3	325,632	22·4	1,454,678	155·6	167·1
N.-W. F. P. .	3,482	37·2	3,010	32·2	2,867	30·6	9,359	130·5	154·1
Punjab .	72,232	38·8	57,277	30·7	56,764	30·5	186,273	167·6	166·8
Delhi . .	1,669	31·7	1,800	34·2	1,789	34·0	5,258	164·9	149·7
U. P. . .	94,702	38·7	89,885	36·7	60,207	24·6	244,794	139·5	148·6
Bihar . .	60,175	49·3	38,051	31·2	23,818	19·5	122,044	113·2	119·9
Orissa . .	23,736	48·7	16,274	33·4	8,753	18·0	48,763	197·4	221·9
Bengal . .	137,798	58·8	64,150	27·4	32,353	13·8	234,301	146·7	184·7
C. P. . .	68,631	49.4	39,096	28·2	31,079	22·4	138,806	218·6	238·2
Bombay . .	47,572	40·2	41,345	34·9	29,508	24·9	118,425	152·7	174·2
Sind . .	3,344	39·1	3,217	37·6	1,999	23·4	8,560	105·7	121·3
Madras . .	156,239	52·5	72,995	24·5	68,240	22·9	297,474	175·5	166·1
Coorg . .	284	53·7	119	22·5	126	23·8	529	139·9	168·3
Assam . .	16,989	46·8	12,546	34·6	6,764	18·6	36,299	149·7	164.7
Ajmer-Merwara .	1,027	27·1	1,401	36·9	1,365	36·0	3,793	183·0	211·5

TABLE I (*vii*).

	Deaths under one week.	Rate *per mille* of live-births.	Percentage of: Deaths under one month.	Percentage of: Total infant deaths.
British India	**420,715**	**45·0**	**61·2**	**28·9**
N.-W. F. P.	1,775	24·8	51·0	19·0
Punjab	39,543	35·6	54·7	21·2
Delhi	936	29·4	56·1	17·8
U. P.	60,089	34·2	63·5	24·5
Bihar	42,461	39·4	70·6	34·8
Orissa	13,328	54·0	56·2	27·3
Bengal	82,040	51·4	59·5	35·0
C. P.	38,919	61·3	56·7	28·0
Bombay	27,365	35·3	57·5	23·1
Sind	1,784	22·0	53·3	20·8
Madras	101,604	60·0	65·0	34·2
Coorg	172	45·5	60·6	32·5
Assam	10,068	41·5	59·3	27·7
Ajmer-Merwara	631	30·4	61·4	16·6

TABLE I (*viii*).

	Infant deaths: Males.	Infant deaths: Females.	Rates *per mille* of corresponding live-births: Males.	Rates *per mille* of corresponding live-births: Females.
British India	**794,339**	**660,339**	**163·3**	**147·4**
N.-W. F. P.	5,504	3,855	135·1	124·5
Punjab	102,921	83,352	174·9	159·4
Delhi	2,807	2,451	170·9	158·5
U. P.	136,247	108,547	145·8	132·2
Bihar	67,066	54,978	121·0	105·0
Orissa	26,311	22,452	207·0	187·3
Bengal	127,641	106,660	153·9	138·8
C. P.	74,645	64,161	228·9	207·7
Bombay	63,838	54,587	159·7	145·2
Sind	4,748	3,812	105·3	106·3
Madras	160,612	136,862	185·6	165·0
Coorg	268	261	134·4	146·0
Assam	19,666	16,633	156·6	142·3
Ajmer-Merwara	2,065	1,728	184·3	181·5

Mortality among Children.

5. The proportion of children under 10 years of age to the total population as enumerated at the 1931 census was 28 per cent. But, as will be seen from table I(*ix*) below, of the total mortality at all ages 47·0 per cent occurred among children under ten. Further, of the total child mortality 50 per cent occurred among infants. The problems of child and particularly infant health are therefore so important that they must be given a prominent place in the public health programme of the country.

TABLE I(*ix*).

	Under one year.	% of total deaths.	1—5 years.	% of total deaths.	5—10 years.	% of total deaths.	Total under 10 years.	% of total deaths.
British India . . .	**1,454,678**	**23·6**	**1,111,314**	**18·0**	**331,599**	**5·4**	**2,897,591**	**47·0**
N.-W. F. P. . . .	9,359	21·1	7,642	17·3	2,728	6·2	19,729	44·6
Punjab . . .	186,273	30·9	126,602	21·0	29,370	4·9	342,245	56·7
Delhi	5,258	31·1	3,615	21·4	733	4·3	9,606	56·8
U. P.	244,794	21·9	231,684	20·7	54,288	4·9	530,766	47.5
Bihar	122,044	16·4	143,592	19·3	47,465	6·4	313,101	42·0
Orissa	48,763	24·5	29,877	15·0	10,050	5·0	88,690	44·5
Bengal	234,301	21.5	150,155	13·8	75,457	6·9	459,913	42·2
C. P.	138,806	26·9	104,244	20·2	25,487	4·9	268,537	52·1
Bombay	118,425	23·9	103,725	21·0	24,333	4·9	246,483	49·8
Sind	8,560	19·1	6,717	15·0	2,522	5·6	17,799	39·7
Madras . . .	297,474	26·8	172,998	15·6	46,595	4·2	517,067	46·5
Coorg	529	14·1	365	9·7	201	5·4	1,095	29·2
Assam	36,299	22·1	26,948	16·4	11,888	7·2	75,135	45·8
Ajmer-Merwara . . .	3,793	26·8	3,150	22·3	482	3·4	7,425	52·5

Still-births.

6. The figures for still-births in British India and the different provinces are given below :—

TABLE I (*x*).

	Male.	Female.	Total.	Rate *per mille* of live-births.	Male still-births per 100 female still-births.
British India .	**107,258**	**85,383**	**192,641**	**20·6**	**126**
N.-W. F. P. . .	124	72	196	2·7	172
Punjab . .	4,633	2,982	7,615	6·9	155
Delhi . . .	295	205	500	15·7	144
U. P. . . .	7,231	5,575	12,806	7·3	130
Bihar . . .	15,816	12,757	28,573	26·5	124
Orissa . . .	5,800	4,922	10,722	43·4	118
Bengal . .	35,987	28,956	64,943	40·6	124
C. P. . . .	9,267	7,352	16,619	26·2	126
Bombay . .	7,696	6,051	13,747	17·7	127
Sind . . .	610	423	1,033	12·8	144
Madras . .	14,830	11,995	26,825	15·8	124
Coorg . . .	19	20	39	10·3	95
Assam . .	4,881	4,015	8,896	36·7	122
Ajmer-Merwara .	69	58	127	6·1	119

Rainfall.

7. Taking the year as a whole the rainfall was 27 per cent or more in defect in the Punjab, Sind, Rajputana, Gujarat and North Hyderabad. Over the rest of the country, it was within 20 per cent of the normal. The following table I (*xi*) gives for each province the actual and normal rainfall figures for different periods of the year.

For further details reference should be made to the "Memorandum on the rainfall and other weather conditions of India in 1939," by the Director General of Observatories, India, from which this table has been compiled.

TABLE I(*xi*).

	January to February.		March to May.		June to September.		October to December.		Total.	
	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.
Mean of India	1·0	1·1	3·3	3·9	29·8	32·1	4·7	4·3	38·8	41·4
N.-W. F. P.	3·7	2·5	7·0	4·2	5·1	8·0	0·4	1·2	16·2	15·9
Punjab	2·5	1·9	2·1	2·0	9·8	15·3	0·1	0·8	14·5	20·0
U. P.	1·3	1·5	0·4	1·4	31·7	33·5	0·5	1·8	33·9	38·2
Bihar	2·1	1·4	2·1	3·4	45·5	42·0	3·5	3·0	53·2	49·8
Orissa	0·8	1·4	3·0	5·7	43·8	43·4	9·0	6·9	56·6	57·4
Bengal	0·7	1·3	8·1	12·6	62·6	54·4	9·0	6·0	80·4	74·3
C. P.	0·8	1·3	2·0	1·7	41·2	40·6	1·5	2·8	45·5	46·4
Bombay	0·0	0·2	0·5	1·5	34·8	39·3	2·5	3·4	37·8	44·4
Sind	1·4	0·3	1·1	0·5	0·2	5·2	0·0	0·3	2·7	6·8
Madras	0·9	1·2	7·7	6·0	25·6	28·6	21·0	16·2	55·2	52·0
Assam	1·4	2·2	20·7	25·1	64·0	65·9	7·3	7·0	93·4	100·2
Rajputana	0·8	0·6	0·4	0·9	12·3	19·1	0 0	0·8	13·5	21·4
Central India	0·7	0·8	0·1	0·9	33·1	33·1	0·1	1·6	34·0	36·4
Hyderabad	0·0	0·5	1·0	2·0	18·8	26·0	4·3	3·7	24·1	32·2
Mys	0·2	0·3	5·7	5·3	20·4	22·4	11·9	8·2	38·2	36·2

Agricultural Conditions.

8. Table I (*xii*) gives the cultivated and uncultivated acreage† in British India and different provinces during the years 1938-39 and 1939-40.—

TABLE I (*xii*).

		Cultivated.		Uncultivated.	
		Net area actually sown.	Current fallows.	Culturable waste other than fallows.	Not available for cultivation.
		Acres.	Acres.	Acres.	Acres.
British India	1939-40	**209,971,545**	**47,118,573**	**97,381,198**	**89,312,019**
	1938-39	209,377,838	48,325,002	94,180,437	91,807,971
N.-W. F. P.	1939-40	**2,000,617**	**630,467**	**2,924,018**	**2,668,715**
	1938-39	2,070,207	607,739	2,866,660	2,679,231
Punjab	1939-40	**25,744,129**	**4,984,732**	**14,489,389***	**12,984,273**
	1938-39	25,151,597	5,790,871	14,275,353*	12,983,323
Delhi	1939-40	**198,976**	**24,251**	**63,683**	**81,647**
	1938-39	172,314	50,829	62,604	82,709
U. P.	1939-40	**36,499,642**	**2,479,406**	**9,888,666**	**9,906,391**
	1938-39	36,081,950	2,795,085	9,964,452	9,928,409
Bihar	1939-40	**17,991,700**	**6,778,600**	**6,801,745**	**6,148,162**
	1938-39	17,978,400	6,791,000	6,800,775	6,148,185
Orissa	1939-40	**6,434,576**	**1,680,606**	**3,177,386***	**6,211,600**
	1938-39	6,507,729	1,646,240	3,138,765*	6,211,434
Bengal	1939-40	**24,916,400**	**4,742,823**	**6,630,162***	**9,468,752**
	1938-39	24,730,100	5,015,347	6,638,732*	9,300,924
C. P.	1939-40	**24,212,756**	**4,085,887**	**14,040,108***	**4,882,156**
	1938-39	24,369,333	3,950 319	14,017,848*	4,881,011
Bombay	1939-40	**28,540,030**	**5,232,279**	**951,007***	**5,665,135**
	1938-39	28,779.649	4,994,829	913,021*	5,712,230
Sind	1939-40	**4,945,843**	**5,165,818**	**8,144,707**	**11,202,677**
	1938-39	5,108,271	5,005,638	5,505,834	13,798,854
Madras	1939-40	**31,472,163**	**9,572,246**	**11,096,756**	**14,508,070**
	1938-39	31,383,337	9,860,540	10,862,821	14,497,130
Coorg	1939-40	**148,606**	**160,757**	**11,690**	**359,474**
	1938-39	144,696	164,667	11,690	359,474
Assam	1939-40	**6,638,768**	**1,412,955**	**18,689,408**	**4,577,400**
	1938-39	6,618,912	1,412,955	18,774,650	4,577,400
Ajmer-Merwara.	1939-40	**227,339**	**167,746**	**472,473**	**647,567**
	1938-39	281 343	238,943	347,232	647,607

*Culturable area included.

†NOTE—The figures are provisional and subjectto revision.

Table I (*xiii*) gives the areas in acres under food crops in British India and the provinces during 1939-40—

TABLE I (*xiii*).

	Area under food grains.	Area under other food crops.	Total area under food crops.
	Acres.	Acres.	Acres.
British India.	187,050,270	10,400,518	197,450,788
N.-W. F. P.	1,945,031	144,131	2,089,162
Punjab	19,898,397	926,607	20,825,004
Delhi	178,470	7,437	185,907
U. P.	38,717,287	2,892,686	41,609,973
Bihar	19,625,900	1,417,100	21,043,000
Orissa	6,164,618	251,174	6,415,792
Bengal	24,173,700	1,592,800	25,766,500
C. P.	20,542,572	337,375	20,879,947
Bombay	19,951,487	560,046	20,511,533
Sind	4,244,286	69,445	4,313,731
Madras	25,701,444	1,663,209	27,364,653
Coorg	89,783	19,270	109,053
Assam	5,610,638	499,746	6,110,384
Ajmer-Merwara	206,657	19,492	226,149

NOTE.—The figures are provisional and subject to revision.

Famine Relief.

9. During 1939, scarcity conditions prevailed in the following areas :—

Madras.—Owing to the general failure of the north-east monsoon conditions of scarcity existed in the districts of Coimbatore and Chingleput, where relief works were opened in a number of areas. Cyclones and floods visited the districts of Tanjore, West Godavari, Kistna, Guntur and Trichinopoly resulting in a damage to property and loss of cattle and human lives. Prompt measures were taken for the relief of the people rendered homeless.

Bengal.—The Burdwan, Presidency, Chittagong and Dacca Divisions were visited by high floods, causing damage to crops and to human and cattle lives in certain districts. The timely distribution of paddy seedlings, agricultural loans and gratuitous relief enabled cultivators in most of the affected areas to harvest a good crop.

Punjab.—Owing to the failure of the monsoon during 1938 and 1939 famine conditions in the Hissar and Rohtak districts were considerably intensified. Consequently relief had to be afforded on a large scale. With the onset of the cold weather following a long period of inadequate nutrition, the general health of the people in some parts of the Hissar district showed signs of deterioration. Special measures were carried out for meeting the situation and these included

the provision of medical relief and the supply of germinated grain and *amla* to the people for improving the quality of their diet.

Central Provinces and Berar.—On account of the sudden cessation of the monsoon, relief had to be provided on an extensive scale in order to provide employment for agricultural labour. Relief works were opened at 75 places in C. P. and 183 places in Berar and the works were closed by the end of November 1939.

Sind.—Famine conditions prevailed in the desert portion of the Thar Parkar district and relief measures were organised on a large scale by the Government and by other agencies.

Delhi.—Test works (construction of roads) were undertaken south of Mahrauli and west of Alipur.

Ajmer-Merwara.—Famine conditions continued to prevail in the province throughout the year. In addition to the ordinary scheduled programme 29 famine works for the relief of distress were started and concession rates for the import of fodder were introduced. Free grazing was allowed in all open areas throughout the period.

Assam.—The situation created by floods did not improve much in 1939. Gratuitous relief and other measures were undertaken by the Government.

Indian States.

10. The birth, death and infantile mortality rates of a number of Indian States are given in table P of appendix I. As was pointed out last year, birth and death rates as low as five *per mille* or even less were recorded in a certain number of States and these must necessarily be due to defective registration. It is to be hoped that the health authorities concerned will pay attention to the improvement of vital statistics in their States.

SECTION II.

MATERNITY AND CHILD WELFARE.

Introduction.

11. Vital statistics are an index of the health of the nation and provide evidence of the relative importance of the different health problems of the community. The figures given in the statistical section of this report indicate that the welfare of mothers and children is one of the most pressing public health problems in India to-day. Of the 6,165,234 total deaths in 1939, 47·0 per cent occurred in children under the age of 10 years and 41·6 per cent among those below five years of age. In order to complete the picture of maternal and child mortality, to these figures must be added 192,641 still-births and some 200,000 maternal deaths arising out of childbirth. Deaths among women of all ages during the year totalled 2,932,984 and of these 609,625 took place between the ages of 15 and 40. In this age period the female death rate exceeded that of the male as will be seen from the table below, while in all the other age periods the male rate was the higher. The risks attendant on pregnancy and parturition are largely responsible for these higher rates of mortality :—

Age period	Death rate per 1,000 Males	Females
15—20	7·2	8·6
20—30	8·7	11·0
30—40	11·6	12·1

The loss of life among the sections of the community who come within the scope of the maternity and child welfare services amounted to the figure of 3,368,258 in 1939. This serious loss of life is accompanied by much illhealth among the mothers and children who survive. Many who escape death are left with varying degrees of disability of a temporary or permanent nature. An appreciable proportion of this mortality and suffering would undoubtedly have been prevented if the services of an efficient maternity and child welfare organisation were generally available to the people.

Maternal Mortality.

12. The information received in the office of the Director-General, Indian Medical Service, relating to maternal deaths occurring in 1939 in certain hospitals in India having more than 300 deliveries a year is summarised below. Tabulation has been done with respect to the cause of death, age and gravidity. The re-classification of the various causes of death shown on individual returns from hospitals into those which are in accordance with the International List of the Causes of Death was carried out by Dr. M. I. Neal Edwards, W. M. S.

The total number of maternal deaths for which the information has been classified is 1,257 of which 1,044 are due directly to childbearing causes (83·0 per cent) and 213 to diseases associated with childbearing (17·0 per cent). The proportion of deaths due to anaemia is high in relation to other causes and this disease has been shown as a separate heading in the tables below. Similarly acute yellow atrophy which is classed under diseases of the liver in the International List has been shown separately in the following tables and the figures have also been included among the deaths due directly to childbearing.

Table II (*i*) presents the distribution by causes of the total maternal deaths.

TABLE II(*i*).

Cause of death.	Number of deaths during 1939.	Percentage of the total (1,044) during 1939.	Percentage of the total (1,368) during 1938.
Abortion (septic)	14	1·34	1·39
Abortion (non-septic)	5	0·48	0·73
Ectopic gestation	6	0·57	0·51
Other accidents of pregnancy	6	0·57	0·58
Ante and post-partum haemorrhages	162	15·52	13·24
Puerperal sepsis	243	23·28	25·88
Puerperal tetanus	7	0·67	0·15
Eclampsia, albuminuria and chronic nephritis	168	16·09	22·44
Other toxaemias of pregnancy	22	2·11	1·97
Embolism, thrombosis and sudden death	31	2·97	2·41
Accidents of labour and operative shock	172	16·48	11·99
Other and unspecified conditions	5	0·48	0·07
Anæmia	185	17·72	18·64
Acute yellow atrophy	18	1·72	..
Total deaths due directly to childbearing	1,044	100·00	100·00
Disease associated with childbearing	213	..	190
Grand total	1,257	..	1,558

In last year's report a similar classification of the information received from different hospitals in India for the year 1938 was published. These figures are shown in the last column of the above table. It will be seen that the percentages for the different causes of death during 1938 and 1939 closely correspond. Puerperal sepsis, toxaemias of pregnancy and anaemia rank high as causes of maternal deaths in both the years.

AGE AND CAUSE OF DEATH.

Table II(*ii*) presents the distribution of maternal deaths according to age and cause of death. Of the total maternal deaths analysed (1,257) 12 occurred below 15 years of age, nine in the age group 41 to 45 and one at the age of 46. On the other hand the proportions of maternal deaths at the age periods 16-20, 21-25, 26-30 were nearly 26 per cent, 28 per cent and 29 per cent respectively.

TABLE II(*ii*).

Age groups.

Cause of death.	13—15	16—20	21—25	26—30	31—35	36—40	41—45	46—50*
Abortion (septic)	..	1·09	1·06	2·35	..	2·08	..	..
Abortion (non-septic)	..	..	0·35	1·34	..	..	..	
Ectopic gestation	..	0·73	..	1·34	..	..	..	
Other accidents of pregnancy	..	0·36	1·41	0·34	..	..	..	
Ante and post-partum haemorrhages	8·33	11·68	14·54	17·45	21·67	18·75	11·11	
Puerperal sepsis	33·33	22·64	25·18	22·15	20·83	27·08	22·22	
Puerperal tetanus	..	1·09	0·35	1·01	..	..	..	
Eclampsia and albuminuria	41·68	26·28	17·38	8·06	10·00	10·43	11·11	
Other toxaemias of pregnancy	..	2·19	3·19	2·01	0·83	..	..	
Embolism, thrombosis and sudden death	8·33	2·55	3·19	2·68	2·50	6·25	..	
Accidents of labour and operative shock	8·33	12·05	9·58	21·14	27·50	27·08	11·11	100·00
Other and unspecified conditions	..	..	1·06	0·67	..	..	..	
Anaemia	..	17·15	20·58	18·12	16·67	8·33	22·22	
Acute yellow atrophy	..	2·19	2·13	1·34	..	..	22·23	
Total deaths due to childbearing	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

*This single case of maternal death was at the age of 46.

The importance of eclampsia and albuminuria compared with other causes of maternal deaths in the earlier age periods (13-15 and 16-20) is emphasised in this table. It is more important than even sepsis in these age groups. On the other hand haemorrhages and accidents of labour rise in importance in the later age periods. Puerperal sepsis has claimed a high proportion of deaths in practically all the age groups. Anaemia too is responsible for a relatively high proportion of mortality at all ages.

Gravidity of mothers and cause of deaths.

The distribution of deaths by gravidity and cause in table II(*iii*) shows that eclampsia and albuminuria form the most important cause of death in primigravidae. From the fourth pregnancy onwards this cause becomes relatively less important. Sepsis and anaemia claim large proportions of mortality at practically every age period, while haemorrhages and accidents of labour are less important among primigravidae than among women undergoing later pregnancies.

TABLE II (iii).

Gravidity.

Cause of death.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Abortion (septic)	2·07	1·22	0·85	0·85	2·44	1·20	...	...	...	...	...	16·67	...	...	...
Abortion (non-septic) . . .	0·34	0·61	0·85	...	...	...	2·08	2·13	...	...	...	...	...	...	...
Ectopic gestation	1·38	...	1·71	...	...	...	...	...	...	...	...	...	...	...	...
Other accidents of pregnancy . .	0·69	0·61	0·85	0·85	...	1·20	...	...	...	...	...	...	...	...	...
Ante and post-partum haemorrhages	8·62	13·41	10·27	17·80	21·95	18·07	22·93	14·89	32·56	36·00	31·25	16·67	25·00	...	100·00
Puerperal sepsis	25·86	23·78	23·08	18·64	21·95	28·93	12·50	25·53	25·58	28·00	6·25	...	25·00	...	...
Puerperal tetanus	0·69	0·61	0·85	1·69	1·22	...	...	...	...	...	...	...	...	...	...
Eclampsia and albuminuria . .	26·90	17·68	17·95	8·47	4·88	8·43	14·58	10·64	9·30	4·00	12·50	...	...	...	...
Other toxaemias of pregnancy . .	1·73	3·66	4·27	2·54	1·22	1·20	2·08	...	...	...	...	16·67	...	...	...
Embolism, thrombosis and sudden death.	4·48	1·22	4·27	1·69	3·66	...	6·25	...	...	...	12·50	49·99	...	...	...
Accidents of labour and operative shock.	10·69	14·03	12·82	19·48	23·17	20·48	18·75	21·28	25·58	28·00	18·75	...	25·00	...	...
Other and unspecified conditions .	...	1·22	1·71	...	1·22	...	...	...	...	...	...	...	...	...	...
Anaemia	14·14	20·73	19·67	24·60	17·07	19·29	20·83	23·40	6·98	...	18·75	...	25·00	...	...
Acute Yellow Atrophy	2·41	1·22	0·85	3·39	1·22	1·20	...	2·13	...	4·00	...	...	...	...	...
Total deaths due directly to child-bearing.	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

It will be seen that the information relating to the specific causes of death given in tables II (*ii*) and II (*iii*) show considerable resemblance to one another.

Provision for Maternity and Child Welfare Work.

13. Table B in appendix III gives the numbers of welfare centres and of the staff employed in them in British India during 1939. The number of centres was 1,021 as against 993 in 1938, local bodies and voluntary organisations being mainly responsible for their maintenance. The number of centres and the staff employed vary widely from province to province.

The information given in the provincial public health reports regarding maternity and child welfare work is summarised below.

In the North-West Frontier Province 3,074 confinements were conducted by trained *dais* in 1939 as against 2,517 in 1938. The number of maternity beds in 15 hospitals in the province was 177 and 1,049 deliveries took place in hospitals in 1939.

The maternity and child welfare staff employed in schemes approved by the Madras Public Health Department, cared for 105,679 expectant mothers, 36,571 infants and 22,997 pre-school children while 60,783 labour cases were attended. Fiftysix medical women, 54 health visitors and 481 midwives were employed in these approved schemes. Compared with 1938, the number of medical women employed increased by 16 during 1939 and of health visitors and midwives by 12 and 42 respectively.

The amounts spent for maternity and child welfare work by the local boards and municipalities respectively in Madras Presidency rose from Rs. 1,06,947 and Rs. 3,12,460 in 1938 to Rs. 1,22,718 and Rs. 3,56,083 in 1939.

A post of Supervisor of Maternity and Child Welfare attached to the Bengal Public Health Department was created and a medical woman was appointed to it in September 1939. Further, provision was made for Government grants-in-aid for the building and maintenance of maternity and child welfare centres in that province. The maintenance grant provided covers also the salary of a health visitor. Building grants are on the scale of half the capital cost up to a maximum of Rs. 3,000 for a welfare centre and up to Rs. 4,000 for a welfare centre with a lying-in ward. The response from local authorities was good ; nine schemes were approved during the year and of these three were sanctioned. Standard plans for the building and equipment of the centres were drawn up and circulated to local authorities.

During the year the Bombay Mofussil Maternity, Child Welfare and Health Council appointed in addition to the touring honorary adviser, who is a medical man, a touring woman doctor and a touring health visitor. The Council maintains 50 centres in 14 districts, an increase of three over the 1938 figure. The Satara Health Association maintains six maternity centres in the district which are supervised by a touring health visitor. The response in Bombay Province to the Government offer to bear four-fifths of the cost of maintaining four nurse-midwives in District Board areas as part of the programme of medical relief in rural areas, was not encouraging. With the object of utilising the material available for the training of midwives in mofussil hospitals and of eliminating the indigenous *dai*, the Bombay Government sanctioned during the year a course for assistant midwives.

As a first step towards the eight-year plan for the provision of a trained midwifery service the Sind Government decided to train five candidates. Government scholarships of Rs. 20 p.m. tenable for 12 months were sanctioned and in order to attract suitable persons, appointments were guaranteed after the training.

In the United Provinces the provincial training centre for assistant midwives commenced work in the Silver Jubilee Health School in September 1939. The school was planning to start a health visitors' class in 1940. The linking up of the midwifery and health visiting courses is a step towards a comprehensive training in public health nursing and the experiment will be watched with interest.

In the Punjab eight new welfare centres were opened in 1939 bringing the total number of such institutions to 102. It is stated that a number of welfare centres situated in urban areas include within the range of their activity the surrounding rural area also. The training of *dais* has shown progress. In 1939 the number of *dais* under training throughout the province numbered 2,593 and 627 *dais* obtained their certificates. In addition to the above, 2,246 previously trained *dais* practised in the areas served by the various health centres. It is stated that refresher courses for these women were arranged once a month at most of the centres. A total of 39,524 labour cases was conducted by *dais*, either trained or under training, and of these health visitors supervised 11,055 cases. Medical aid was called in for 502 cases.

The health visitors have been trained as vaccinators and they carried out 3,335 primary and 16,250 revaccinations.

Eleven students were trained as health visitors during the year at the Punjab Health School and all of them succeeded in obtaining the diploma at the end of the course.

In Delhi Province the maternity and child welfare organisation worked during the year with varying degrees of efficiency in the different urban and rural areas. In New Delhi there were six centres in 1939 and, of them, only one was housed properly in a building constructed for the purpose. In spite of the fact that the centres were not suitably housed it is pointed out that much good work was done during 1939. The number of confinements rose from 1,004 in 1938 to 1,218 during the year under review. The attendances at the clinics increased from 26,310 to 35,505 and the number of home visits from 31,192 to 31,880. No maternal death took place among the cases undertaken by the centres while the maternal mortality rate for the rest of New Delhi was 3·3 *per mille*.

The infant mortality rate of the population served by the centres however rose from 65 *per mille* in 1938 to 75 in 1939, although this figure compared favourably with that for the rest of the infant population, namely, 85 *per mille*.

In the Notified Area Civil Lines 64 per cent of the total births in the year were attended to by the centres. The maternal mortality rate was 3·3 *per mille*. On the other hand the infant mortality rate continued to be relatively high, 101 and 107 *per mille* during 1938 and 1939 respectively. The Chief Health Officer points out the necessity for emphasising the preventive aspect of child welfare work and for an increase in home visiting, which should be supervised by an active health visitor.

In Delhi city it is reported that, although another centre was opened in 1939 bringing the total to 12, little progress was made in improving the work carried on by the welfare organisation. It is stated that the educative and preventive aspects of welfare work were ignored, that the centres functioned mainly as dispensaries and that health visitors limited their functions to the duties of midwives. The infant mortality rates for 1938 and 1939 were 156 and 170 *per mille* respectively. The Delhi Municipal Committee employed during the year only 20 health visitors. The Chief Health Officer considers that the number ought to be increased to 80 if a serious attempt was to be made to reduce the rate of infant mortality.

As regards the rural areas the activities under this head may be described (1) in relation to the Najafgarh Health Unit and (2) the rest of the province. In Najafgarh the appointment of a woman doctor for the control of the organisation had a salutary effect by improving the quality of the work. Medical aid was given to 48 cases of labour which, in the absence of this doctor, would have had to be brought to the city for treatment. A rise in the clinic attendances and in the number of prenatal cases was further evidence of the growing popularity of the maternity service provided for this rural population.

In the rural areas exclusive of Najafgarh it is reported that some improvement was recorded during the year. A woman doctor supervises the activities of the welfare centres and her appointment was followed by a marked rise in the number of attendances at the clinics from 12,813 in 1938 to 25,753 in 1939. Three centres existed at Narela, Nangloi and Mahrauli. The areas served by these centres were widened during the year and, out of a possible 1,361 cases available to the health staff, it is stated that over 80 per cent were cared for by them. In 1938 the number of confinements dealt with by the centres was 548 and in 1939 the figure was 1,088. It is reported that no maternal death took place among the cases treated by the centre staff. As regards infant mortality the general rate in the rural area was 206 *per mille* while for the populations served by the centres the figures were much lower, *e.g.*, Narela 98, Nangloi 86 and Mahrauli 56.

SECTION III.

VACCINATION AGAINST SMALLPOX.

Vaccination and Revaccination Statistics.

14. Smallpox continues to be one of those epidemic diseases which are widely prevalent in this country from year to year. The average figures for annual mortality from this disease during quinquennial periods from 1877 to 1936 have ranged between 162,942 and 66,075. The corresponding figure for the period, 1935-39, was 67,130. It is true that, in spite of increasing completeness of registration during recent years, a reduction in the number of deaths from this disease is becoming noticeable ; but the fact that vaccination and revaccination should eliminate the disease altogether emphasises the importance of making further efforts for the effective immunisation of the people.

In 1939 primary vaccination was compulsory in 80·7 per cent of the towns and 62·8 per cent of the rural circles in British India as a whole. In the provinces the proportion for towns was as low as 52 per cent and 59 per cent respectively for Bombay Presidency and the United Provinces. With respect to rural circles, in Bombay primary vaccination was compulsory only in one among the twenty circles of the province while, in the Central Provinces, the rate was 15 per cent. On the other hand, in the provinces of Bengal and Madras, primary vaccination was compulsory throughout the rural and urban areas. It will thus be seen that wide differences exist between the provinces in regard to the areas where primary vaccination can be enforced.* As regards revaccination, the law makes no provision for its enforcement in most parts of the country. In Madras Presidency revaccination was made compulsory in both urban and rural areas in 1932 and provision exists for the enforcement of the measure at intervals of ten years. It is also understood that compulsory revaccination was in force in 1939 in 26 out of the 32 towns and in 11 among the 117 rural circles of Assam, in four of the five towns of Ajmer-Merwara and in certain areas of Bengal where the Epidemic Diseases Act was brought into operation for urgent measures against outbreaks of the disease.

The protection that primary vaccination confers on the individual lasts only for a limited period. In an article, " The General Problem of Smallpox in 1929 " in the monthly Epidemiological Report of the Health Section of the Secretariat of the League of Nations for November 1929, the results were described of repeated vaccination at varying intervals of 44 children after their primary vaccination. It is stated that " Of the vaccinees, four per cent had lost their immunity after one year and 83 per cent after four years. For all practical purposes, immunity may be said to have disappeared at the end of eight years."

The results of certain studies in revaccination made by the King Institute, Guindy, during an extensive revaccination campaign in Madras city in 1939 throw further light on this problem. Of 1,990 cases of revaccination investigated, it is stated that " 33·6 per cent were complete ' failures ', 39·4 per cent showed the reaction of immunity, 19 per cent showed a modified reaction

*See table B, in appendix V.

and eight per cent showed typical ' takes ' ". The results classified under the different age-groups according to the number of previous revaccinations are shown below*:—

Age-group.	Revaccination.	Total number.	Total take.	Percentage of take.
5—10 years	Previously *Nil*	315	158	50·2
	Do. One or more	89	25	28
11—20 years	Do. *Nil*	117	46	39·2
	Do. One or more	235	65	27·5
20—30 years	Do. *Nil*	122	62	50·8
	Do. One or more	330	86	26
30—40 years	Do. *Nil*	63	20	31·7
	Do. One or more	205	48	23·4
40—50 years	Do. *Nil*	18	7	38·9
	Do. One or more	43	14	32·5

A striking feature of this table is that, among 315 children in the age group 5—10 years with no history of previous revaccination, nearly 50 per cent became unprotected by the tenth year of their life. In every age group, the percentage of ' takes ' among those who have had one or more previous revaccinations is smaller than among those who have had only their primary vaccination. The Director also quotes examples to show the effect of repeated and organised revaccination in conferring protection. In a group of 114 employees in the harbour workshop, who had periodical revaccination, only 0·9 per cent reacted to revaccination on the present occasion. Similarly among 79 persons on the clerical establishment of one office, who had been repeatedly revaccinated, the proportion of ' takes ' was only 6·3 per cent in comparison with 30·1 per cent for 63 persons in another office with no history of revaccination.

These studies again emphasise the importance of repeated revaccination of the individual if the level of his immunity is to be kept sufficiently high to protect him from smallpox. Vaccinations at intervals of four to five years can alone produce the desired effect. In regard to both primary and revaccination the position is unsatisfactory in this country and unless the provincial health authorities can take more vigorous steps for fully protecting the people, the disease will continue to be responsible for much preventable suffering, incapacitation and mortality.

The statistics relating to vaccination in British India and some Indian States are given in the tables of this section and in appendix V to this report. All the figures relate to the official year 1939-40. In all the other sections of the report and in all the appendices except appendix V the statistics are for the calendar year 1939.

Table III (*i*) sets out the figures for primary and revaccinations during 1939-40 in the provinces of British India.

---

* Page 31, Report of the King Institute of Preventive Medicine, Guindy, for the year ending 30th September 1939.

TABLE III (*i*).

	Primary vaccination.		Revaccination.		Total.	
	Number of vaccinations performed during 1939-40.	Increase (+) or decrease (—) from last year.	Number of revaccinations performed during 1939-40.	Increase (+) or decrease (—) from last year.	Total 1939-40.	Increase (+) or decrease (—) from last year.
British India	10,399,676	+195,028	15,301,134	+1,812,228	25,700,810	+2,007,256
N.-W. F. P.	161,873	+18,025	152,482	+6,655	314,355	+24,680
Punjab	1,072,841	+15,744	3,430,138	—142,092	4,502,979	—126,348
Delhi	34,862	+2,005	206,867	+75,083	241,729	+77,088
U. P.	1,635,158	+28,823	471,111	+162,017	2,106,269	+190,840
Bihar	1,017,374	+22,579	820,087	+314,118	1,837,461	+336,697
Orissa	231,214	—6,809	475,061	+72,393	706,275	+65,584
Bengal	2,909,956	+33,337	5,017,380	+44,927	7,927,336	+78,264
C. P.	495,950	—18,802	284,796	+166,560	780,746	+147,758
Bombay	667,049	+38,866	510,152	+255,110	1,177,201	+293,976
Sind	143,228	+6,215	80,937	—2,225	224,165	+3,990
Madras	1,516,894	+35,047	3,320,875	+730,426	4,837,769	+765,473
Coorg	2,809	+288	3,420	—63	6,229	+225
Assam	471,571	+7,771	474,305	+83,071	945,876	+90,842
Ajmer-Merwara	38,897	+11,939	53,523	+46,248	92,420	+58,187

An increase of two million vaccinations has been recorded during the year under review in British India, of which 90 per cent is under revaccination and the remainder under primary vaccination. In last year's report it was pointed out that there had been a fall in respect of both primary and revaccinations as compared with the previous year. An increase of two million vaccine operations during 1939-40 is therefore a satisfactory record of progress. As regards primary vaccination Orissa and the Central Provinces have alone shown decreases in 1939 while, in respect of revaccination, the Punjab has recorded a large reduction in the number of vaccine operations and Sind and Coorg relatively smaller decreases.

Table III (*ii*) affords a comparison of the progress of primary and revaccinations during the nine years, 1931-32 to 1939-40.

TABLE III (*ii*).

Year.	Number of primary vaccinations.	Number of revaccinations.	Percentage of children under one year successfully vaccinated to total births during the calendar year.
1931-32	9,012,950	5,334,148	46
1932-33	9,365,226	10,082,421	45
1933-34	9,284,821	11,604,663	43
1934-35	9,506,666	12,443,590	44
1935-36	10,022,554	14,011,904	45
1936-37	10,404,125	12,805,764	45
1937-38	10,419,989	14,913,397	46
1938-39	10,204,648	13,488,906	46
1939-40	10,399,676	15,301,134	46
Annual average 1934-35 to 1938-39	10,111,596	13,532,712	45

There has been a consistent increase in the number of vaccinations performed and this no doubt reflects the concern of the provincial health authorities to raise the level of immunity of the population.

The percentages shown in the last column give some measure of the protection conferred on the infant population. There is no indication of any real progress having been made during the period. The rates are based on the number of births during the calendar year while the vaccinations relate to the official year. This fact is not likely to introduce any serious margin of error because the birth rate is relatively stable at specific seasons of the year and the proportion of deaths during the three months, January, February and March, to the total annual figure will not therefore show any considerable variation from year to year.

Table III (*iii*) gives the percentages of success for primary and revaccinations during 1938 and 1939 in the different provinces.

TABLE III (*iii*).

	Primary.		Revaccination.	
	1938.	1939.	1938.	1939.
British India . . .	98	97	48	46
N.-W. F. P. . . .	98	99	82	80
Punjab	99	99	65	63
Delhi	98	97	60	52
U. P.	98	97	48	36
Bihar	99	98	56	34
Orissa	97	97	64	60
Bengal	86	85	31	31
C. P.	98	97	58	56
Bombay	100	100	49	45
Sind	100	100	26	27
Madras	98	97	24	21
Coorg	96	97	55	55
Assam	95	95	60	59
Ajmer-Merwara . . .	92	99	85	98

The percentage of success for primary vaccinations in 1939 was as low as 85 per cent in Bengal while in all the other provinces the rate was 95 per cent or higher. During the previous four years, 1935-38, the corresponding rates for Bengal were 88, 95, 88 and 86. This continued low rate of success for primary vaccination in the province requires investigation. In the paragraph on the Bengal Vaccine Institute in the annual report for 1939 the Director of Public Health states that all samples of vaccine lymph were tested,

before issue, for potency both bacteriologically and on human beings, " with the result that no complaint has been received from anywhere as regards its purity and potency ". The responsibility for the vaccine becoming ineffective in many cases must then lie on the several factors that may lessen the potency of the lymph after its issue from the Vaccine Institute, such as want of adequate care in protecting it from exposure to heat, undue delay in the use of the lymph or various practices adopted by the parents of the infants for preventing the action of the vaccine. A higher rate of success than that achieved during the past few years should be attainable if adequate administrative measures are taken to improve the practice of vaccination among the people.

The desirability of making the vaccinators perform more vaccinations than they do in many provinces has been repeatedly stressed in these annual reports. Table III (*iv*) sets out the average number of vaccinations performed by a vaccinator in 1939 in the different provinces. The figures for 1938 are also given for comparison.

TABLE III (*iv*).

	Average number of vaccinations performed by a vaccinator.	
	1938.	1939.
British India	2,809	2,951
N.-W. F. P.	6,294	5,715
Punjab	7,720	7,587
Delhi	4,658	6,043
U. P.	1,995	2,219
Bihar	1,242	1,520
Orissa	2,245	2,436
Bengal	3,008	2,772
C. P.	1,705	2,175
Bombay	2,395	3,200
Sind	2,661	2,635
Madras	3,025	3,456
Coorg	1,001	1,038
Assam	1,645	1,833
Ajmer-Merwara	2,140	4,201

Most of the provinces have increased the average number of vaccinations carried out by the vaccinator. However, the differences between the provinces continue to be striking. The Punjab and Delhi lead with figures about six or seven times higher than that of Coorg which has shown the smallest record of work for the vaccinator. Another striking fact is that, although the figure for 1938 was high in Delhi Province, the rise during 1939 was nearly 30 per cent. The large numbers of vaccinations that have been performed in the Punjab and in Delhi by individual vaccinators suggest that, if adequate efforts are made, it should be possible to raise considerably the existing level of performance in the other provinces also.

Vaccine Institutes and Supply of Vaccine.

15. Table III (*v*) shows the quantities of vaccine produced by and issued from the different provincial institutes during 1939-40 :—

TABLE III (*v*).

Vaccine Institutes.	Output in doses.	Issue in doses.
Punjab	9,129,375	9,377,255
U. P.	3,402,900	3,525,513
Bihar	3,179,171	3,358,815
Bengal	8,077,200	9,202,606
C. P.	789,040	790,250
Bombay	2,698,295	1,781,745
Madras	4,678,560	3,363,555
Assam	1,110,290	1,096,208

The average yield of pulp from buffalo and cow calves differed widely in the different institutes. In the Punjab the yield of a buffalo calf was 130·2 grammes, in the United Provinces 69·2, the Central Provinces 65·5, Bombay 61·8, Bihar 60·8, Madras 27·9 and Bengal 26·6. The average yield from cow calves also varied, the highest yield being 40·5 grammes in the Central Provinces and the lowest in Bengal and the United Provinces, 25·3.

In the School of Tropical Medicine, Calcutta, experimental studies were carried out on animals with variola virus. In monkeys intradermal injections produced only local necrotic lesions while in splenectomised monkeys the infection produced generalised lesions. In guinea pigs also the virus produced papular lesions in 2-4 days. From the nasopharynx of 76 convalescent cases of smallpox and from 16 healthy persons it is reported that a virus was recovered which produced lesions in animals resembling those of variola virus. It is also reported that work was done on the pathogenicity and antigenic structure of various strains of vaccinia virus which were in use in the different vaccine institutes of India.

Indian States.

16. Vaccination statistics relating to a large number of Indian States are shown in table D in appendix V. The percentage of success for primary vaccination may be taken as an index of the quality of the vaccine lymph and of the care and expedition with which it is used for vaccination after issue from the vaccine institute. It will be seen that the rate is over 90 per cent in the majority of States although in some the figure is definitely lower. Examples of States with percentages below 80 are Alwar (76), Tehri Garhwal (77), Ramdrug (34), Raigarh (76), Dhar (78), Sitamau (65) and Sailana (67). The causes for such low rates require investigation by the health authorities concerned. Brief notes on certain important States are given below :—

Hyderabad State.—Though the number of primary vaccinations has been on the increase year by year, further increase is still desirable since the number of primary vaccinations performed continues to fall short of the number of births each year. It is stated that the number of children born in the State each year would be in the neighbourhood of six and a half lakhs as against a little over four lakhs of primary vaccinations performed during the year.

In 1939-40, 12,207 revaccinations were carried out as compared with 20,028 during the previous year. This discrepancy is stated to be due to the wrong entry of " secondary " vaccinations under revaccinations in the past and this mistake has now been corrected. Revaccination is not popular with the public and it is therefore stated that under a proposed Vaccination Act, provision will be made for the compulsory revaccination of all persons every tenth year. The success rates of primary and revaccinations were 96·1 per cent and 54·5 per cent respectively. The average number of vaccinations performed by each vaccinator rose from 2,570 during the previous year to 2,752 during the year under review. In order to encourage vaccination on as extensive a scale as possible instructions have been issued that Assistant Health Officers, Health Inspectors and Sub-health Inspectors should vaccinate all unprotected children whom they come across during the course of their duties.

Travancore State.—An intensive campaign for the immunisation of the people by primary and revaccinations has been in progress from 1933-34 onwards. The Director of Public Health states that by 1936 the whole State was once covered by this intensive effort and that successive campaigns are in progress so as to include the whole population within a period of three years. It is stated that, in consequence, the incidence of smallpox has been effectively controlled in the State.

Cochin State.—A total of 160,515 vaccinations was performed during the year with a success rate of 91·2 per cent for primary vaccination and 7·4 per cent for revaccination. It is stated that the public offers no opposition to the vaccinators, that primary and revaccinations have been compulsory in the State for a number of years and that sanitary inspectors verify about 80 per cent of the vaccinations carried out in the State.

Mysore State.—During the year a whole-time health officer was appointed to check the work of the vaccination staff. Special campaigns for intensive vaccination were carried out in a number of areas. The average success rate for primary vaccination was 95·9 per cent and for revaccination 50·6 per cent. The rate for primary vaccination is reported to have been uniformly high in all the districts, it being nowhere less than 92 per cent.

Kashmir State.—Smallpox occurred in mild epidemic form in several tehsils of Kashmir Province and it is reported that mass vaccination was carried out and that the outbreak was soon brought under control. Jammu Province remained free from smallpox during the whole of the year 1939-40. The success rate for primary vaccination was 98·6 per cent and for revaccination 89·0 per cent.

SECTION IV.

PUBLIC HEALTH WORKS.

17. Information regarding the total public health expenditure of municipalities and district boards and expenditure under separate heads such as conservancy, water supply and drainage is given in tables B and C of appendix VI While these figures are being published for the sake of continuity in respect of the information incorporated in the annual report from year to year, there is so little yearly variation in the public health expenditure incurred by local bodies that no special comments are required on the present occasion. Brief remarks regarding individual provinces are given below.

N.-W. F. Province.

18. The district boards of the province had during 1939-40 a total income of Rs. 21,01,331 of which only Rs. 93,090 or 4·4 per cent was spent on public health. The expenditure on water supplies was Rs. 22,232, an increase of Rs. 9,871 over that of the previous year. The contribution made by Government to the district boards for public health purposes amounted to Rs. 24,385 the money being spent in connection with anti-malarial measures in certain villages around Kohat district and the improvement of water supply in some villages of four districts in the province.

The total income of municipal and notified area committees during the year was Rs. 24,18,751 and, of this amount Rs. 4,65,589 or 19·2 per cent was spent on public health activities. It will thus be seen that a relatively larger proportion of the income was devoted to public health in the urban areas than in the villages. Compared with the previous year the expenditure on water supplies was reduced from Rs. 1,33,629 to Rs. 72,824. The Government grants-in-aid during the year to municipal and notified area committees for public health purposes amounted to Rs. 4,060.

Punjab.

19. It is reported that rural water supply schemes received considerable attention from the authorities in the Punjab. During the financial year 1939-40 a sum of Rs. 2,75,200 was allotted by the Government for various sanitary works such as the re-modelling of well-heads in order to protect drinking water from contamination, the sinking of new wells, and the paving and drainage of village lanes. It is also stated that, in addition to this amount, the villagers themselves contributed a sum of Rs. 1,41,547 towards these works, besides making contributions in labour and material when they were not in a position to make payment in money. The Director of Public Health points out that the amount of money spent by the Provincial Government on rural water supply schemes within the last few years totalled Rs. 9 lakhs. A gratifying feature of the situation, it is stated, is that, wherever health officers show initiative and resource in stimulating the interest of the people, the villagers have been willing and anxious to contribute a share towards these works which are meant for the improvement of their own health.

In nine towns schemes for water supply were completed and in five other towns the work was in progress during the year. As regards drainage scheme

for urban areas an important event was the commencement in 1939 of work on the Lahore sewerage scheme. Drainage works were completed in five other towns and were in progress in four more.

United Provinces.

20. In regard to rural water supplies, the provincial Government provided in the budget for 1939-40 a sum of Rs. 3 lakhs from the Government of India grant for rural development and another amount of Rs. 34,000 from provincial funds. It is reported that large numbers of wells were constructed in several districts and that hand pumps were installed in many places. Government had framed some years ago model byelaws regulating the future construction of wells in villages, but it is reported that local bodies have not generally adopted these byelaws and put them into effect, with the result that the construction of wells on insanitary lines continues as in the past.

Attempts were being made during the past few years to popularise the use of latrines and urinals in the villages. Borers for the construction of bore-hole latrines were obtained in some districts while in others little progress was made in soil sanitation.

It is reported that the rural health staff continued to maintain close touch with the provincial programme of rural development and that advice was given regarding the carrying out of sanitary improvements in the villages.

The results of periodical analyses of samples of water from 28 towns with piped water supply are given in the report of the Director of Public Health. In a number of towns bacteriological analyses showed that the quality of the water was below the required standard. A few glaring instances are :—

Name of the town.	Number of samples examined bacterio-logically.	Number found to be unsatisfac-tory bacter-iol ɔgically.
1. Muttra	101	52
2. Allahabad	281	118
3. Jhansi	149	130
4. Naini Tal	256	82
5. Lucknow	251	124

These are all important towns and the results shown above indicate that the question of improving the quality of the water supplied to the inhabitants of these towns requires urgent attention.

Bihar.

21. In the rural areas expenditure on sanitation by districts boards during 1938-39 included Rs. 2,36,588 on conservancy, Rs. 11,170 on drainage, Rs. 1,34,175 on water supply and Rs. 12,118 on markets and fairs.

In the municipalities the Director of Public Health reports that all the minor recommendations made by the Department were carried out but that major schemes, such as those for the provision of protected water supply, drainage, sanitary markets and the opening up of congested areas were not taken up because of the chronically low financial condition of these local bodies. The total amounts spent in the municipalties of the province under the four heads of conservancy, drainage, water supply and markets and fairs were Rs. 10,10,534, Rs. 1,72,139, Rs. 3,65,980 and Rs. 39,081 respectively.

Orissa.

22. Of the total income of district boards in the province during 1938-39 which amounted to Rs. 28,44,403, public health expenditure accounted for 6·0 per cent as against 7·7 per cent during the previous year. The Director of Public Health rightly points out that, in the rural areas, the expenditure on public health is wholly inadequate and that this fall in expenditure during the year under review is all the more regrettable. It is pointed out that a wide prevalence of bowel diseases takes place at the beginning of the rainy season and that this points to the contamination of water supplies with human excreta. In order to help the campaign for the prevention of soil pollution, borers for the construction of bore-hole latrines were purchased and supplied by the Public Health Department to some of the district boards. The necessity of expanding the rural health organisation in order to make it possible to render more prompt and effective service to the people for the control of communicable disease is stressed by the Director of Public Health in his report.

There are eight municipalities in the province and, of these, only two Puri and Berhampur, have piped water supplies. In the other towns drinking water is derived mainly from shallow wells, rivers and in some cases from masonry wells and tube wells. It is stated that lack of funds has stood in the way of major water supply and drainage works being undertaken in these towns.

Bengal.

23. The amounts spent by district boards during 1938-39 under the heads water supply, drainage and sanitation in the rural areas of the province were Rs. 8,64,418, Rs. 66,332 and Rs. 21,30,503 respectively. In addition, Union Boards spent Rs. 9,60,747 on water supply, Rs. 93,272 on drainage and Rs. 87,521 on conservancy.

In municipal areas the total amount spent on sanitary works during 1938-39 was Rs. 53,68,314. The sum included varying amounts of expenditure on the water supply and drainage of a number of towns.

Central Provinces.

24. The Government made a grant of Rs. 21,055 for the construction of 80 wells from the Government of India grant for rural reconstruction, and a sum of Rs. 15,306 for another group of 66 wells from the provincial funds.

Under the provisions of the village Sanitation and Public Management Act, which was in operation, in 65 villages, a total sum of Rs. 1,42,696 waa collected, and of this amount a sum of Rs. 1,42,201 was spent on water supply, drainage, cleaning of village sites, roads and other miscellaneous charges.

From the Town and Village Fund under Mukaddam Rules, a sum of Rs. 8,403 was spent for similar purposes, while an additional sum of Rs. 1894 was spent in the improvement of water supply in ryotwari villages in the districts of Betul, Jubbulpore, Bilaspur and Nimar.

It is reported that, in municipal towns, the situation regarding water supply showed a little improvement during the year and that the total expenditure under this head was Rs. 11,94,006.

A sum of Rs. 2,34,195 was spent on drainage and Rs. 11,67,258 on conservancy in municipal areas.

Bombay.

25. For the purpose of encouraging village improvements a Provincial Board of Rural Development was established by the Government. Its main function is to advise Government on general principles and policy regarding rural development activities. Village improvement work, which used to be carried out under the auspices of the District Village Improvement Committees, was transferred during the year to District Rural Development Boards, the financial control being vested in the Registrar of Cooperative Societies and Director of Rural Development.

The Director of Public Health states that the protected water supplies of municipal towns were regularly sterilized and that a high standard of purity was maintained. In regard to rural water supply the provincial Government placed at the disposal of the Commissioners of Divisions grants totalling Rs. 8,55,000 for their improvement. An investigation was in progress during the year for preparing a list of villages which are in urgent need of provision or adequate drinking water. It is reported that 687 new draw-wells were onstructed during the year and that 268 step-wells were converted into draw-w ells.

Improvements were carried out to Surat and Ahmedabad drainage schemes. Methods of purification of trade effluents were under investigation and it is reported that satisfactory results were obtained. The expenditure on public health measures was approximately Rs. 3-5-2 per head of the population in Ah medabad and averaged about Rs. 2-13-1 for the remaining municipalities.

Sind.

26. Improvement of rural water supplies is being carried on by the revenue authorities in the district as well as by the Rural Reconstruction Departmentt Government grants are distributed by the Revenue Commissioner for Sind in consultation with the Public Health Department. It is reported that 85 tube-wells and 107 draw-wells were constructed during the year.

The percentage of income spent on public health measures by district boards varied from seven in Larkana district to 3·6 in Dadu district. Public health expenditure per head of the population ranged from Re. 0-1-7 in Larkana district to Re. 0-0-4 in Sukkur district.

In municipalities the *per capita* expenditure on public health was approximately Rs. 2-7-10 in Karachi and averaged Rs. 2-2-8 for the remaining municipalities employing health staffs.

Madras Presidency.

27. In this province the rural sanitation campaign has been continuously maintained by six rural sanitation units, each consisting of a medical officer and suitable subordinate personnel. The activities of these units during the year under review may be grouped under :—

(1) hookworm survey,

(2) educational propaganda on hookworm disease and the dangers of soil pollution,

(3) mass treatment against hookworm and

(4) construction of latrines in rural areas and the encouragement of their use by the people.

It is reported that 723 latrine seats were put up and that 146 seats were either repaired or reconstructed.

Mass treatment for hookworm infection was given to 205,444 persons.

The ultimate success of soil sanitation work in any area depends on the construction and use of latrines by the people, and to popularise their use provision was made by the local authorities for the supply of squatting slabs for borehole latrines in private houses either at half the cost or at concession rates. Suitable staff were also maintained by the district boards of many districts to assist the rural sanitation units in the construction of public and private latrines.

Reference was made in previous reports to the programme for the expansion of rural water supply. In view of the administrative and technical difficulties experienced in the carrying out of the programme, a committee was appointed during the year for the consideration of the following points :—

(*a*) types of water supply suited to different villages and soil conditions,

(*b*) suitable and economical agencies for the sinking of bore-wells,

(*c*) suitable agency for the maintenance of bore-wells,

(*d*) centralisation of purchases for rural water supplies, and

(*e*) the extent to which local manufacture of the requisite articles can be made.

The committee held several sittings and their final report was submitted to Government towards the close of the official year (1939-40). Although variations exist in the conditions prevailing in the different provinces, it is certain that the investigations carried out by this committee would be of interest to the health authorities of other provinces also.

It is reported that no new water supply scheme was brought into operation during the year in the municipalities of the province. The number of municipalities with protected water supply was 43 in 1939. Improvements or extensions of existing schemes were under execution in 19 municipalities, while plans and estimates for water supply schemes were either completed or were under preparation in three other municipalities.

The execution of drainage schemes in eight municipalities was started during the year under review, while plans and estimates for three other municipalities were under preparation. The investigation of schemes for ten municipalities and two panchayats were either in progress or were completed during the year.

The Madras Public Health Act which came into force with effect from 7th March 1939 contains many provisions which are calculated to help considerably towards the improvement of environmental sanitation. In particular, attention may be drawn to the following provisions :—

(1) local authorities are required to ear-mark a definite percentage of their income for public health expenditure,

(2) local authorities can be required by the provincial Government to provide a sufficient supply of drinking water, and to levy a compulsory water tax for financing water supply schemes,

(3) provision should be made by local authorities for proper drainage and for an adequate number of public latrines.

Other provisions include measures for the prevention and abatement of nuisance, reservation of areas for residential purposes, control over insanitary buildings and the abatement of overcrowding.

Assam.

28. There were 18 municipal boards and ten town committees in Assam during the year under review and their total income was Rs. 11,58,372. The percentage of this income spent on sanitary works was 48·4 as against 44·5 per cent during the previous year. An expenditure of Rs. 11,565 was made by the Public Works Department on the maintenance of water supplies and drainage and on town improvements.

For the rural areas local boards spent a sum of Rs. 1,86,816 on public health measures during 1939 compared with Rs. 1,77,479 in the previous year.

SECTION V.

HEALTH OF JAILS IN INDIA.

General.

29. As in other years, it has been found convenient this year to discuss the health of the jails in British India, under the headings :—

(*i*) all classes of jails,

(*ii*) district and central jails, with a separate paragraph devoted to the health of the jail population in the Andamans.

Jails of all Classes.

30. *Population, accommodation and overcrowding.*—Information regarding accommodation and average daily population for the years 1938 and 1939 is given in table V(*i*) below—

TABLE V(*i*).

Province.	Authorised accommodation, excluding hospitals and observation cells.		Average daily population.	
	1938.	1939.	1938.	1939.
N.-W. F. P.	5,263	5,263	5,757	5,666
Punjab	14,713	14,713	19,660	20,543
U. P.	32,523	36,067	28,768	32,895
Bihar	13,013	13,013	10,896	11,876
Orissa	2,257	2,257	1,666	1,620
Bengal	15,911	16,584	19,006	19,057
C. P.	6,515	6,697	4,522	5,044
Bombay*	15,805	13,271	8,518	8,433
Sind	5,205	5,205	4,675	4,758
Madras	18,720	18,401	13,140	14,157
Assam	3,772	3,776	3,304	3,216

The usual fluctuations are noted in the authorised accommodation. Bombay has reduced accommodation by 2,534 but reports that a new sub-jail at Nadiad will be completed in 1940-41, which will increase available accommodation and relieve the present overcrowding in that province.

The United Provinces on the other hand, have increased accommodation by 3,544 over the previous year and show an increase of 4,127 in the average daily population. The reason for this increase is due to the arrests following

* Including Dharwar Borstal School.

the Madhe-Sahaba, Tabarra and Khaksar movements which were launched during the year. Three camp jails and the Allahabad and Benares lockups were used to accommodate the unusual influx of prisoners.

The Punjab, where overcrowding was reported last year, has shown a further increase in the daily population while the authorised accommodation remained the same.

The six central jails in Bengal with a total daily average of 9,867 still remain very overcrowded.

The provinces of Sind, Madras, Bihar and the Central Provinces while recording increases in the daily average population over that of the previous year are still below their authorised accommodation and show little or no tendency towards overcrowding. The Central Provinces report the opening of a new subsidiary jail at Narsinghpur and a new barrack in the Borstal Institution at the same place.

Constantly sick.—Table V(*ii*) shows the average daily number of constantly sick and the rate per 1,000 of the average daily population among all classes of prisoners in the various provinces during 1938 and 1939.

TABLE V(*ii*).

Province.	Average number of constantly sick.		Constantly sick rate per 1,000 of average daily population.	
	1938.	1939.	1938.	1939.
N.-W. F. P.	30	99	23	17
Punjab	334	336	17	16
U. P.	497	532	17	16
Bihar	209	211	19	18
Orissa	33	32	20	20
Bengal	676	735	36	39
C. P.	64	65	14	13
Bombay*	146	142	17	17
Sind	89	79	19	17
Madras	176	176	13	12
Assam	78	77	24	24

Bengal, besides showing the highest sick rate in India is the only province to record an increase over the constantly sick rate for 1938. There seems no apparent reason for the high rate as no epidemic was reported from any of the jails although hookworm disease is said to be on the increase.

Admission to hospitals and deaths.—Table V(*iii*) shows the number of annual hospital admissions and deaths for the years 1938 and 1939.

*Including Dharwar Borstal School.

TABLE V(*iii*).

Province.	Admissions.				Deaths.			
	Number.		Rate per 1,000 of average daily population.		Number.		Rate per 1,000 of average daily population.	
	1938.	1939.	1938.	1939.	1938.	1939.	1938.	1939.
N.-W. F. P.	2,229	2,008	387	354	43	20	7	4
Punjab	8,439	9,163	429	446	13	132	6	6
U. P.	12,338	14,275	429	434	03	244	7	7
Bihar	3,932	3,968	361	334	08	110	10	9
Orissa	690	714	414	441	26	16	16	10
Bengal	17,657	18,814	929	987	194	204	10	11
C. P.	1,571	1,679	347	333	93	76	21	15
Bombay*	4,937	5,082	580	603	74	58	9	7
Sind	3,341	3,845	715	808	60	31	13	7
Madras	4,295	3,965	327	280	96	88	7	6
Assam	1,155	1,092	350	340	64	85	19	26

The North-West Frontier Province, Madras and Assam recorded slight decreases in the numbers of admissions to hospitals while the remaining provinces showed increases. Concurrent with the great increase in the average daily population over 1938, the United Provinces also recorded the greatest increase in admissions to hospitals over the figures for 1938. Bengal recorded the highest admission rate and Assam the highest death rate.

Weight of prisoners.—Table V(*iv*) shows the percentage of prisoners at the time of discharge from the jail who had (*a*) gained weight, (*b*) remained stationary and (*c*) lost weight. The same information with regard to 1938 is added for easy comparison, while in table V(*v*) is shown the percentage of prisoners who had gained in weight at the time of their discharge, over a period of 15 years in the different provinces. A table showing the percentage of prisoners over a 15-year period who had lost weight on release from jail was published in last year's report. A study of both these tables presents an interesting sidelight on the nutrition of a selected population. In spite of improved diets during the past few years the percentage of prisoners who had gained on release is not very materially affected. In the Central Provinces and in Madras a high percentage of prisoners has consistently gained weight while the Punjab and the North-West Frontier Province have remained at the other end of the scale. Orissa since her separation from Bihar has maintained a high percentage whereas Sind has shown a downward trend.

The remaining provinces maintained an average gain with Bengal falling off somewhat during the past four years.

On the whole this state of affairs is a favourable reflection on the general nutrition standards in jails but, as suggested in last year's report, this question might wi h profit be made the subject of investigation within the provinces. A study of the types of prisoners admitted, age and sex distribution, amount of sickness, regular and adequate dieting and a comparison with nutritional standards of the community, might serve as a useful check-up on individual jails.

*Including Dharwar Borstal School.

Table V(*iv*).

Province.	Gained weight.		Stationary.		Lost weight.	
	1938.	1939.	1938.	1939.	1938.	1939.
N.-W. F. P.	49	55	43	39	8	6
Punjab	49	47	44	45	7	8
U. P.	56	50	34	41	10	9
Bihar	54	57	32	30	14	13
Orissa	62	68	28	27	10	5
Bengal	47	44	38	41	15	15
C. P.	63	66	28	25	9	9
Bombay	50	52	32	32	18	16
Sind	50	57	17	18	33	25
Madras	64	60	32	36	4	4
Assam	57	57	28	29	15	14

Table V(*v*).

Table showing the percentage of prisoners who had gained in weight at the time of their release from jail.

Province.	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.
N.-W. F. P.	50	49	62	62	57	52	52	56	56	60	49	53	59	49	55
Punjab	44	48	54	44	47	46	39	39	45	45	40	41	45	49	47
U. P.	65	66	68	59	60	57	55	56	57	57	58	57	60	56	50
Bihar, Orissa	63	58	57	57	56	50	49	55	53	52	59	57	56	54	57
												60	62	62	68
Bengal	50	53	53	52	54	50	56	58	67	50	50	49	47	47	44
C. P.	63	64	65	57	55	49	56	64	60	62	62	62	68	63	66
Bombay, Sind	48	51	51	57	53	53	54	51	55	51	52	54	58	50	52
												47	41	50	57
Madras	73	74	75	75	71	67	75	75	74	70	67	64	63	64	60
Assam.	55	53	51	56	57	58	55	54	55	55	54	59	56	57	57

District and Central Jails.

31. *Morbidity and mortality statistics.*—Figures for diseases are available from all provinces only for the populations of district and central jails. These figures for individual provinces are shown in appendix VIII. A consolidated statement of causes of sickness is shown in table V(*vi*) while in table V(*vii*) the chief causes of mortality are shown. Figures for the previous year are also given for comparison.

TABLE V(*vi*).

	1938.		1939.	
	Admissions.	Rate per 1,000 of average daily population.	Admissions	Rate per 1,000 of average daily population.
Malaria	12,383	113	9,819	86
Dysentery	3,999	37	3,944	34
Other respiratory diseases	3,229	30	3,671	32
Influenza	3,212	29	3,444	30
Diarrhœa	1,824	17	1,690	15
Pyrexia of uncertain origin	1,099	10	1,228	11
Pneumonia	933	9	1,038	9
Tubercle of the lungs	716	7	720	6
Enteric fever	301	3	301	3
Smallpox	25	0·2	31	0·3
Cholera	17	0·2	13	0·1

TABLE V(*vii*).

	1938.		1939.	
	Deaths.	Rate per 1,000 of average daily population.	Deaths.	Rate per 1,000 of average daily population.
Pneumonia	195	1·8	194	1·7
Tubercle of the lungs	177	1·6	141	1·2
Other respiratory diseases	53	0·5	132	1·2
Dysentery	81	0·7	81	0·7
Anæmia and debility	33	0·3	33	0·3
Enteric fever	26	0·2	33	0·3
Malaria	24	0·2	23	0·2
Diarrhœa	17	0.2	12	0·1
Influenza	10	0·1	16	0·1
Cholera	3	0·03	5	0·04
Pyrexia of uncertain origin	2	0·02	4	0·03
Smallpox	1	0·01	3	0·03

Cerebrospinal meningitis.—Bengal reported two cases and one death. There were five cases and no death in the Punjab while the Central Provinces reported seven cases and two deaths.

Malaria.—It is satisfactory to note that the number of admissions for the country as a whole continues to fall. Bengal recorded 457 fewer admissions in 1939 than in the previous year. The province of Sind recorded an increase in the incidence of malaria ; the Sukkur district prison was mainly responsible. The remaining provinces showed an average malaria incidence.

Influenza.—The total admissions for influenza amounted to 3,444, a slight increase over the previous year. An epidemic of influenza was reported from Orissa with 106 cases and one death as well as from Bombay where 160 cases were admitted with one fatality. These epidemics were localised in one or two central jails. It is such outbreaks as these that often are the forerunners of a pandemic and the sudden appearance of numerous cases of peculiar respiratory infections should be a warning for careful investigation, especially in view of the present world instability, a condition which favours pandemic spread of influenza.

Cholera.—There was a widespread epidemic of cholera among the civil population in the United Provinces. It speaks well for the preventive methods used by the jail authorities that only 11 cases with five deaths were reported amongst the jail inmates. Bihar and Bengal with one case each, were the only other provinces to report cases of cholera amongst the jail population.

Plague.—No attacks were recorded in the jails of British India during the year under review.

Dysentery.—The admission rate for dysentery dropped from 37 in 1938 to 34 in 1939 and with the exception of the United Provinces where an increase of 318 cases was reported over the figures for 1938, the condition as regards dysentery may be considered satisfactory.

Pneumonia.—The death rate *per mille* has dropped from 1·8 in 1938 to 1·7 in 1939. From Sind comes a report of the efficacy of M. and B. 693 where the number of deaths was two as compared with 17 in the previous year. The number of cases was 40 in 1939 and 104 in 1938. With the extended use of this modern treatment of pneumonia, further reductions in the all-India mortality rate for pneumonia should be expected.

Tubercle of the lungs.—The number of admissions into hospitals for this disease has shown a slight increase over the figures of the previous year, the Punjab continues to show a declining rate while the number of admissions in Bombay was more than doubled in 1939.

Reforms.

32. The institution of jail reforms has had a beneficial influence on the physical and mental health of prisoners. It is gratifying to note the additions to the jail diets, especially to the diets of those engaged on hard labour, and the increasing tendency for jail gardens to produce more green vegetables for home consumption.

The lot of the prisoner in most jails has been improved by the issue of newspapers, books and periodicals. More radio sets are being installed and the prisoners are being encouraged to play games. Vocational training, Boy Scout and Girl Guide movements, cinema shows and literacy campaigns continue to serve their useful purpose in making jail life reformative rather than punitive. The formation of after-care associations is a valuable adjunct to good jail administration.

Andamans.

33. The year 1939 is reported to have been one of the healthiest on record for the jail population in spite of the apparent increase in the death rate for cellular jails where the average daily strength was only 368 compared with the average daily strength of 5,666 of the *talabdar* and self-supporting convict population. There was no overcrowding in any part of the jail and a high standard of sanitation was maintained.

It is convenient to discuss the health of (1) the cellular jails and barracks population, and (2) *talabdars* and self-supporting prisoners, separately. Table V(*viii*) below shows the death rates from all causes, the constantly sick rates and the hospital admission rates for the years 1938 and 1939.

TABLE V(*viii*).

	Death rate per 1,000 of average daily population.		Constantly sick rate per 1,000 of average daily population.		Hospital admission rate per 1,000 of average daily population.	
	1938.	1939.	1938.	1939.	1938.	1939.
Cellular jails	12	22	29	26	760	622
Talabdars and self-supporting convicts	13	9	31	24	598	508

Table V(*ix*) shows the incidence of the principal diseases for the whole settlement, excluding the cellular jails.

TABLE V(*ix*).

Principal diseases.	Whole Settlement excluding cellular jails.	
	1938.	1939.
Malaria	1,122	981
Dysentery	121	138
Diarrhœa	53	24
Influenza	96	49
Gonorrhœa	30	29
Pneumonia	10	9
Weil's disease	152	49
Tuberculosis	13	17
Syphilis	49	37
Ankylostomiasis	21	94

The incidence of malaria during the past ten years has shown a steady tendency to decline and with the exception of 1936, the year under review records the lowest admissions into hospital for malaria during the last decade. There has also been a welcome drop in the number of admissions for Weil's disease. It is significant to note in this connection that there has been a considerable reduction in the rainfall during the year. The study of the bacteriology of the disease has been intensified and an anti-leptospiral serum prepared from local strains is being tried out. There has been a considerable increase in the incidence of ankylostomiasis reported, which is probably the result of a concerted search during a recent survey. Dysentery and enteric were maintained at a low level and the introduction of carrier testing on foodhandlers should still further reduce the incidence of these intestinal diseases.

There were three cases of smallpox during the year; 2,574 vaccinations, of which 14 per cent were successful revaccinations, were carried out.

Conclusions.

34. The health of the jail population in British India during 1939 may be stated to have been satisfactory. The constantly sick rate and hospital admission rate were 20 and 473 respectively compared with 21 and 479 in 1938. The death rate remained the same as in the previous year, 9 *per mille*. There has been a satisfactory decline in the admission rate for malaria from 113 *per mille* in 1938 to 86 in 1939 and from all provinces come encouraging reports on jail reforms which indirectly have their beneficial effects on the general health and wellbeing of the prisoners.

E. COTTER,
Lieut.-Colonel, I. M. S.,
Public Health Commissioner with the Government of India.

NEW DELHI;
The 31st May 1941.

APPENDICES.

TABLE OF CONTENTS.

APPENDIX I.

Table.		Page.
A.	Estimated population on 30th June 1939 in rural and urban areas and by sex	44
B.	Estimated population on 30th June 1939 by age and sex	45
C.	Births in rural and urban areas	46
D.	Births by months	46
E.	Deaths by months	47
F.	Death rates *per mille* by months	48
G.	Deaths by months in rural areas	48
H.	Deaths by months in urban areas	49
I.	Deaths according to age and sex	50
J.	Death rates according to age and sex	51
K.	Deaths according to age and sex in rural areas	52
L.	Deaths according to age and sex in urban areas	53
M.	Infantile mortality rates in certain towns in British India	54
N.	Infantile mortality in rural and urban areas	56
O.	Crude and standardised death rates *per mille* (direct method) for different provinces in India	57
P.	Vital statistics for Indian States	59

APPENDIX II.

A.	Deaths and rates *per mille* from certain causes or groups of causes of mortality	64
B.	Deaths and rates *per mille* from certain causes or groups of causes of mortality in rural and urban areas	65
C.	Deaths from cholera from 1905 to 1939	67
D.	Deaths and rates *per mille* from cholera in rural and urban areas	68
E.	Deaths from cholera by months	68
F.	Deaths from plague by months in—	
	(*i*) British provinces	69
	& (*ii*) Indian States and Agencies	69
G.	Deaths and rates *per mille* from smallpox in rural and urban areas	70
H.	Deaths from smallpox by months	70
I.	Deaths and rates *per mille* from fevers and malaria in rural and urban areas	71
J.	Deaths from fevers by months	71
K.	Deaths and rates *per mille* from dysentery and diarrhœa in rural and urban areas and by sex	72
L.	Deaths from dysentery and diarrhœa by months	72
M.	Deaths and rates *per mille* from respiratory diseases in rural and urban areas and by sex	73
N.	Deaths from respiratory diseases by months	73
O.	Distribution of quinine, cinchona febrifuge, totaquina and other cinchona alkaloids during 1939	74

TABLE.		PAGE.
	APPENDIX III.	
A.	Maternal death rates *per* 1,000 of live and still-births for certain towns in British India	78
B.	Maternity and child welfare centres in rural and urban areas	80
	APPENDIX IV.	
A.	Expenditure on public health by central and provincial Governments during 1939-40	82
B.	Distribution of health staffs in rural and urban areas	83
	APPENDIX V.	
A.	Vaccination operations performed in British India and in different provinces during 1939-40	86
B.	Number of towns and rural circles in the different provinces in which compulsory primary vaccination was in force during 1939	87
C.	Areas in the provinces in which revaccination was compulsory in 1939	87
D.	Vaccination statistics relating to some Indian States for 1939-40	88
	APPENDIX VI.	
A.	Number of towns having protected water supplies in different provinces	96
B.	Expenditure on public health by municipalities in different provinces during 1938-39	97
C.	Expenditure on public health by district boards in different provinces during 1938-39	98
	APPENDIX VII.	
A.	Papers published in the Indian Journal of Medical Research	100
B.	Papers published in the Indian Medical Gazette	104
C.	Papers published in the Journal of the Malaria Institute of India	111
	APPENDIX VIII.	
	Sickness and mortality of all classes of prisoners in district and central jails in India	114

Appendix I.

Deaths in the rural areas of British India and the provinces are given in table G distributed according to months and in table K by age and sex. The total figure for British India does not, however, correspond in the two cases. This is because, for Madras Presidency, the figures shown in table G are for the area exclusive of municipalities alone, whilst those of table K relate to an area excluding municipalities and rural towns. For this reason the total figure in table G is greater than that of table K by 61,577.

Deaths in urban areas are given in tables H and L. For the above reason the total figure in table L is greater by 61,577 than that in table H.

The figures in tables G and H together equal those in tables K and L.

TABLE A.—ESTIMATED POPULATION ON 30TH JUNE 1939, IN RURAL AND URBAN AREAS AND BY SEX.

	Rural.	Urban.	Total.	Male.	Female.	Area in square miles.	Density per square mile.
BRITISH INDIA . . .	251,903,612	26,405,264	278,308,876	143,352,470	134,956,406	762,658	365
N.-W. F. P. . . .	2,216,234	346,384	2,562,618	1,390,729	1,171,889	13,308	193
Punjab	23,589,499	3,549,034	27,138,533	14,717,005	12,421,528	96,614	281
Delhi	225,691	506,179	731,870	420,188	311,682	572	1,279
U. P.	47,587,337	6,030,918	53,618,255	28,151,681	25,466,574	106,248	505
Bihar	34,034,169	1,414,365	35,448,534	17,731,906	17,716,628	69,348	511
Orissa	7,064,736	225,679	7,290,415	3,482,582	3,807,833	21,492	339
Bengal	49,262,512	3,535,808	52,798,320	27,451,587	25,346,733	72,514	728
C. P.	14,905,623	1,852,423	16,758,046	8,356,969	8,401,077	98,780	170
Bombay	16,079,829	3,753,003	19,832,832	10,273,780	9,559,052	76,389	260
Sind	3,528,681	770,625	4,299,306	2,412,192	1,887,114	46,663	92
Madras	44,487,873	4,008,550	48,496,423	24,043,661	24,452,762	125,438	387
Coorg	154,793	9,394	164,187	90,702	73,485	1,593	103
Assam	8,350,534	215,917	8,566,451	4,508,943	4,057,508	81,882	273
Ajmer-Merwara . .	416,101	186,985	603,086	320,545	282,541	2,367	255

TABLE B.—ESTIMATED POPULATION ON 30TH JUNE 1939, BY AGE AND SEX.

	N.-W. F. P.		Punjab.		Delhi.		U. P.		Bihar.		Orissa.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	41,226	33,734	506,898	503,669	11,532	11,617	827,272	831,127	425,128	435,337	95,738	99,069
1—5 years	169,707	163,593	1,674,489	1,622,284	39,048	38,892	3,214,895	3,249,227	2,178,993	2,318,170	379,627	401,648
5—10 years	197,746	159,275	1,932,476	1,686,144	44,766	38,633	3,591,585	3,103,577	2,543,853	2,339,025	426,775	415,996
10—15 years	176,504	131,759	1,795,621	1,485,363	45,127	36,659	3,328,484	2,720,260	2,189,328	1,941,262	405,219	382,437
15—20 years	122,440	103,809	1,375,017	1,145,559	45,154	33,846	2,548,570	2,233,995	1,443,592	1,495,808	329,836	358,244
20—30 years	239,486	223,877	2,551,762	2,160,555	92,745	63,508	5,028,067	4,647,711	3,016,302	3,179,652	621,398	729,336
30—40 years	191,238	159,391	1,916,622	1,514,399	68,361	41,029	4,074,974	3,644,613	2,556,335	2,542,711	508,334	584,139
40—50 years	121,119	96,460	1,321,697	1,054,711	40,068	24,258	2,842,834	2,471,553	1,741,824	1,662,507	367,883	412,001
50—60 years	72,812	55,374	869,740	668,440	20,221	13,696	1,635,310	1,489,666	987,586	1,003,269	225,391	257,836
60 years and over	58,451	39,617	772,683	580,404	13,166	9,544	1,059,690	1,074,845	648,965	798,887	122,381	167,127

	Bengal.		C. P.		Bombay.		Sind.		Madras.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	875,233	877,628	289,263	297,100	5,298,053	302,838	59,617	56,447	667,197	687,755
1— 5 years	3,178,505	3,266,635	990,003	1,043,440	1,155,748	1,185,266	274,835	262,906	2,788,876	2,864,965
5—10 years	3,755,513	3,329,429	1,074,653	1,042,117	1,327,439	1,230,532	316,536	246,393	3,149,611	3,078,908
10—15 years	3,285,861	2,932,489	972,514	924,052	1,198,990	1,076,76	272,956	192,026	2,896,422	2,743,015
15—20 years	2,405,267	2,678,406	786,065	775,872	899,268	889,02	208,900	162,861	2,100,726	2,238,233
20—30 years	5,028,361	5,007,714	1,481,971	1,517,788	1,859,325	1,781,80	472,839	381,560	4,035,302	4,618,706
30—40 years	4,065,858	3,252,418	1,163,285	1,141,435	1,585,351	1,318,59	384,708	273,083	3,429,357	3,385,067
40—50 years	2,570,024	1,994,925	833,548	784,384	1,009,606	869,41	231,478	162,553	2,401,525	2,249,387
50—60 years	1,371,674	1,170,495	482,715	480,509	570,555	528,356	115,411	86,910	1,455,633	1,433,337
60 years and over	915,291	836,594	332,952	394,380	369,445	376,536	74,912	62,375	1,119,012	1,153,389

	Coorg.		Assam.		Ajmer-Merwara.		British India.	
	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	2,130	2,208	142,121	143,802	10 940	10,035	4,251,448	4,297,366
1—5 years	7,551	7,746	583,297	603,413	35 729	35,712	16,671,303	17,063,897
5—10 years	9,540	9,181	609,508	553,480	37 416	34,895	19,019,417	17,267,085
10—15 years	10,007	9,051	518,124	463,487	37,247	31,177	17,132,404	15,069,740
15—20 years	9,142	7,585	372,007	413,338	32,008	27,953	12,627,992	12,564,532
20—30 years	19,647	15,392	801,308	781,100	59 833	51,300	25,308,341	25,159,999
30—40 years	16,3e2	10,416	678,960	511,753	43,212	37,334	20,677,957	18,416,371
40—50 years	9,391	5,984	427,119	301,831	34,188	27,835	13,952,304	12,117,805
50—60 years	4,424	3,481	232,526	170,943	19,137	16,024	8,063,135	7,378,385
60 years and over	2,508	2,441	148,978	114,361	9,735	10,776	5,648,169	5,621,276

Table C.—Births in Rural and Urban Areas.

	Rural.	Urban.	Total.	Rate per mille Rural.	Urban.	Total.
British India	8,374,804	971,341	9,346,145	33·2	36·8	33·6
N.-W. F. P.	61,674	10,033	71,707	27·8	29·0	28·0
Punjab	980,893	130,711	1,111,604	41·6	36·8	41·0
Delhi	10,258	21,627	31,885	45·5	42·7	43·6
U. P.	1,507,890	247,531	1,755,421	31·7	41·0	32·7
Bihar	1,051,425	26,358	1,077,783	30·9	18·6	30·4
Orissa	241,303	5,705	247,008	34·2	25·3	33·9
Bengal	1,514,020	83,631	1,597,651	30·7	23·7	30·3
C. P.	558,616	76,292	634,908	37·5	41·2	37·9
Bombay	611,233	164,312	775,545	38·0	43·8	39·1
Sind	52,994	27,952	80,946	15·0	36·3	18·8
Madras	1,533,636	161,115	1,694,751	34·5	40·2	34·9
Coorg	3,210	572	3,782	20·7	60·9	23·0
Assam	235,793	6,635	242,428	28·2	30·7	28·3
Ajmer-Merwara	11,859	8,867	20,726	28·5	47·4	34·4

Table D.—Total Births by Months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	772,135	672,755	756,684	696,907	695,885	692,518	748,820	832,514	862,955	914,304	865,900	854,768
N.-W. F. P.	6,627	5,781	6,384	6,214	4,945	5,407	6,032	5,708	5,585	6,133	5,805	7,086
Punjab	98,500	79,391	86,298	72,344	72,627	78,944	95,674	104,468	108,744	108,959	102,061	103,599
Delhi	2,503	1,938	2,157	1,860	2,135	2,503	2,761	3,214	3,324	3,463	3,134	2,893
U. P.	148,148	125,209	133,071	126,574	117,667	123,887	148,688	174,621	180,292	179,529	147,603	150,632
Bihar	95,126	81,284	97,040	84,626	82,648	74,510	78,926	95,838	99,261	107,125	89,797	91,652
Orissa	17,829	16,946	21,471	22,067	25,788	23,724	21,283	20,403	18,828	19,149	19,498	19,417
Bengal	143,478	136,280	150,853	124,503	106,929	88,148	79,021	97,429	123,180	163,820	194,297	189,718
C. P.	46,978	40,712	47,490	45,380	45,411	45,659	51,262	60,517	60,298	69,658	61,176	54,367
Bombay	57,704	51,319	59,781	58,855	62,115	64,328	70,853	75,111	78,356	73,210	66,384	63,029
Sind	7,518	5,986	5,977	5,342	5,528	5,547	6,158	6,976	7,825	8,809	7,632	7,648
Madras	119,957	104,769	124,505	128,269	141,646	153,957	170,965	169,814	156,031	148,861	139,977	136,000
Coorg	311	282	337	442	342	368	370	304	04	250	230	242
Assam	25,604	21,471	19,895	18,941	16,402	14,377	14,912	16,156	17,862	23,371	26,694	26,743
Ajmer-Merwara	1,857	1,437	1,425	1,390	1,702	1,659	1,910	1,960	2,065	1,967	1,612	1,742

TABLE E.—TOTAL DEATHS BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.
BRITISH INDIA .	543,307	449,866	494,168	483,560	505,281	476,938	482,655	530,303	515,788	528,315	562,875	592,178	6,165,234	22·2
N.-W. F. P. . .	5,773	4,178	3,746	3,209	3,241	3,861	3,756	3,048	2,739	2,924	3,395	4,406	44,276	17·3
Punjab . . .	59,533	49,725	48,478	42,367	54,866	54,792	50,390	47,839	45,494	45,714	50,348	53,646	603,192	22·2
Delhi . . .	1,559	1,177	1,309	1,389	2,082	1,579	1,349	1,428	1,236	1,306	1,251	1,235	16,900	23·1
U. P. . . .	87,153	75,708	83,434	89,474	97,364	100,251	97,366	101,534	100,540	99,127	90,959	95,099	1,118,009	20·9
Bihar . .	57,488	42,173	50,568	55,262	57,735	58,687	60,480	75,741	74,056	72,690	68,735	71,300	744,765	21·0
Orissa . . .	18,122	15,282	16,633	16,204	15,096	13,279	15,043	19,360	18,164	16,045	16,824	19,260	199,312	27·3
Bengal . . .	112,667	88,835	98,267	98,947	80,973	71,186	73,040	82,939	79,766	87,171	103,464	113,275	1,090,530	20·7
C. P. . . .	40,850	34,307	40,982	37,652	44,534	34,065	32,174	41,648	49,148	53,326	56,431	50,183	515,300	30·7
Bombay . . .	42,397	37,742	44,943	41,638	40,584	32,362	37,919	42,963	40,950	42,918	44,356	46,115	494,887	25·0
Sind . .	5,397	4,672	4,265	3,632	3,425	2,909	2,825	2,751	2,727	3,330	4,246	4,600	44,779	10·4
Madras . .	93,891	82,189	87,942	78,419	89,645	88,563	92,389	95,586	88,045	89,585	107,693	117,334	1,111,281	22·9
Coorg . .	299	291	334	363	321	368	424	299	320	226	241	264	3,750	22·8
Assam . .	16,828	12,363	11,999	13,735	13,848	14,088	14,630	14,360	11,594	12,857	13,853	13,964	164,119	19·2
Ajmer-Merwara .	1,400	1,224	1,268	1,269	1,567	998	920	807	1,009	1,096	1,079	1,497	14,134	23·4

TABLE F.—DEATH RATES *PER MILLE* BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	23·4	19·4	21·3	20·8	21·8	20·6	20·8	22·9	22·2	22·8	24·3	25·5
N.-W. F. P.	27·0	19·6	17·5	15·0	15·2	18·1	17·6	14·3	12·8	13·7	15·9	20·6
Punjab	26·3	22·0	21·4	18·7	24·3	24·2	22·3	21·2	20·1	20·2	22·3	23·7
Delhi	25·6	19·3	21·5	22·8	34·1	25·9	22·1	23·4	20·3	21·4	20·5	20·2
U. P.	19·5	16·9	18.7	20·0	21·8	22·4	21·8	22·7	22·5	22·2	20·4	21·3
Bihar	19·4	14·3	17·1	18·7	19·5	19·8	20·5	25·6	25·1	24·6	23·3	24·1
Orissa	29·8	25·2	27·4	2617	24·8	21·9	24·8	31·9	29·9	26·4	27·7	31·7
Bengal	25·6	20·2	22·3	22·5	18·4	16·2	16·6	18·9	18·1	19·8	23·5	25·7
C. P.	29·3	24·6	29·3	27·0	31·9	24·4	23·0	29·8	35·2	38·2	40·4	35·9
Bombay	25·7	22·8	27·2	25·2	24·6	19·6	22·9	26·0	24·8	26·0	26·8	27·9
Sind	15·1	13·0	11·9	10·1	9·6	8·1	7·9	7·7	7·6	9·3	11·9	12·8
Madras	23·2	20.3	21.8	19·4	22·2	21·9	22·9	23·7	21·8	22·2	26·6	29 0
Coorg	21·9	21·4	24·4	26·5	23·5	26·9	31·0	21·9	23·4	16·5	17·6	19·3
Assam	23·6	17·3	16·8	19·2	19·4	19·7	20·5	20·1	16·2	18·0	19·4	19·6
Ajmer-Merwara	27·9	24·4	25·2	25·3	31·2	19·9	18·3	16·1	20·1	21·8	21·5	29.8

TABLE G.—DEATHS BY MONTHS IN RURAL AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate Per mille.
BRITISH INDIA	486,880	401,647	440,283	430,986	446,002	424,022	426,613	468,167	460,442	473,942	504,658	533,092	5,496,714	21·8
N.-W. F. P.	5,169	3,762	3,345	2,876	2,799	3,338	3,249	2,613	2,384	2,604	2,974	3,920	39,033	17·6
Punjab	53,164	44,591	43,471	37,216	48,413	48,066	43,679	41,406	40,004	40,938	44,610	47,710	533,268	22·6
Delhi	651	409	398	481	730	572	456	468	434	403	447	399	5,848	25·9
U. P.	74,823	65,491	71,235	76,410	80,832	84,763	81,659	83,435	84,944	85,333	77,854	82,053	948,832	19·9
Bihar	56,188	41,144	49,220	53,863	56,330	57,272	58,065	73,744	72,424	71,222	67,285	69,869	727,226	21·4
Orissa	17,712	14,929	16,230	15,827	14,761	12 926	14,580	18,857	17,799	15,665	16,403	18,777	194,466	27·5
Bengal	105,602	82,751	91,515	92,019	74,949	65,954	67,280	76,951	74,277	81,774	96,560	106,473	1,016,105	20·6
C. P.	36,153	30,174	36,431	33,486	39,460	30,599	28,002	36,322	43,851	47,703	50,896	45,148	458,225	30·7
Bombay	32,159	28,463	34,297	31,851	31,224	24,526	28,683	32,465	31,424	32,875	34,444	35,232	377,643	23·5
Sind	3,854	3,528	3,156	2,541	2,297	1,876	1,816	1,759	1,827	2,340	2,918	3,086	30,998	8·8
Madras	83,891	73,237	78,218	69,928	79,687	79,538	83,405	85,507	78,973	79,802	95,968	105,741	993,895	22·3
Coorg	242	247	276	304	272	321	372	265	279	197	209	224	3,208	20·7
Assam	16,475	12,142	11,729	13,457	13,499	13,774	14,300	13,972	11,282	12,530	13,495	13,666	160,321	19·2
Ajmer-Merwara	777	779	762	727	749	497	467	403	540	556	595	794	7,646	18·4

TABLE H.—DEATHS BY MONTHS IN URBAN AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate *per mille.*
BRITISH INDIA	56,447	48,219	53,885	52,574	59,279	52,916	56,042	62,136	55,346	54,373	58,217	59,086	668,520	25·3
N.-W. F. P.	604	416	401	333	442	523	507	435	355	320	421	486	5,243	15·1
Punjab	6,369	5,134	5,007	5,151	6,453	6,726	6,711	6,433	5,490	4,776	5,738	5,936	69,924	19·7
Delhi	908	768	911	908	1,352	1,007	893	960	802	903	804	836	11,052	21·8
U.P.	12,330	10,217	12,199	13,064	16,532	15,488	15,707	18,099	15,596	13,794	13,105	13,046	169,177	28·1
Bihar	1,250	1,029	1,348	1,399	1,405	1,365	1,765	1,997	1,632	1,468	1,450	1,431	17,539	12·4
Orissa	410	353	403	377	335	353	463	503	365	380	421	483	4,846	21·5
Bengal	7,065	6,084	6,752	6,928	6,024	5,232	5,760	5,988	5,489	5,397	6,904	6,802	74,425	21·0
C. P.	4,697	4,133	4,551	4,166	5,074	3,466	4,172	5,326	5,297	5,623	5,535	5,035	57,075	30·8
Bombay	10,238	9,279	10,646	9,787	9,360	7,836	9,236	10,498	9,526	10,043	9,912	10,883	117,244	31·2
Sind	1,543	1,144	1,109	1,091	1,128	1,033	1,009	992	900	990	1,328	1,514	13,781	17·9
Madras	10,000	8,952	9,724	8,491	9,958	9,025	8,984	10,079	9,072	9,783	11,725	11,593	117,386	29·3
Coorg	57	44	58	59	49	47	52	34	41	29	32	40	542	57·7
Assam	353	221	270	278	349	314	330	388	312	327	358	298	3,798	17·6
Ajmer-Merwara	623	445	506	542	818	501	458	404	469	540	484	703	6,493	34·7

TABLE I.—DEATHS ACCORDING TO AGE AND SEX.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	794,339	660,339	571,761	539,553	174,638	156,961	98,066	85,242	91,101	108,278
N.-W. F. P.	5,504	3,855	4,069	3,573	1,448	1,280	892	923	928	909
Punjab	102,921	83,352	66,447	60,155	15,537	13,833	9,646	9,668	9,732	9,904
Delhi	2,807	2,451	1,758	1,857	364	369	276	286	284	419
U. P.	136,247	108,547	122,947	108,737	29,560	24,728	18,179	16,244	15,199	15,252
Bihar	67,066	54,978	74,461	69,131	26,105	21,360	15,486	11,086	13,789	12,186
Orissa	26,311	22,452	14,836	15,041	5,154	4,896	2,652	2,801	2,881	3,689
Bengal.	127,641	106,660	75,443	74,712	39,587	35,870	21,738	16,741	20,139	28,895
C. P.	74,645	64,161	55,317	48,927	13,519	11,968	6,673	5,797	6,703	7,604
Bombay	63,838	54,587	51,070	52,655	11,900	12,433	5,376	5,789	4,821	6,554
Sind	4,748	3,812	3,591	3,126	1,376	1,146	893	739	845	843
Madras	160,612	136,862	86,330	86,668	23,425	23,170	12,446	12,598	12,265	17,212
Coorg	268	261	193	172	98	103	94	65	110	134
Assam	19,666	16,633	13,638	13,310	6,311	5,577	3,567	2,886	3,260	4,427
Ajmer-Merwara	2,065	1,728	1,661	1,489	254	228	148	169	145	250

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	220,226	277,699	239,422	223,648	253,964	184,201	264,376	205,166	524,357	491,897
N.-W. F. P.	2,011	2,164	2,220	1,999	1,888	1,595	1,985	1,473	3,299	2,261
Punjab	15 952	18,645	14,986	15,443	17,027	14,231	20,315	15,838	50,641	38,919
Delhi	520	821	451	512	455	418	473	357	1,082	940
U. P.	39,147	43,960	41,392	39,571	47,091	33,227	52,046	37,318	102,594	86,023
Bihar	34,998	34,911	36,617	30,262	34,756	25,686	35,900	31,799	56,210	57,978
Orissa	7,976	10,964	8,735	18,679	8,014	6,923	9,817	9,681	13,235	15,075
Bengal	49,607	68,864	54,164	46,897	54,331	36,840	48,994	37,239	77,890	68,278
C. P.	16,613	20,079	18,244	15,895	19,572	13,754	20,413	16,455	38,910	40,051
Bombay	14,322	20,421	16,830	16,809	19,180	13,115	20,475	14,204	45,301	45,257
Sind	2,299	2,395	2,435	2,092	2,538	1,404	2,271	1,051	4,398	2,777
Madras	29,591	43,442	35,134	37,480	41,145	31,422	44,086	34,188	118,444	124,761
Coorg	263	297	313	251	307	158	177	125	191	170
Assam	6,537	10,113	7,507	7,306	7,164	5,072	6,780	5,008	10,999	8,358
Ajmer-Merwara	390	623	394	452	496	356	644	430	1,168	1,049

M.—Males. F.—Females.

TABLE J.—DEATH RATES ACCORDING TO AGE AND SEX.

	*Under 1 year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	163·3	147·4	34·3	31·6	9·2	9·1	5·7	5·7	7·2	8·6
N.-W. F. P. . .	185·1	124·5	24·0	21·8	7·3	8·0	5·1	7·0	7·6	8·8
Punjab . . .	174·9	159·4	39·7	37·1	8·0	8·2	5·4	6·5	7·1	8·6
Delhi . . .	170·9	158·5	45·0	47·7	8·1	9·6	6·1	7·8	6·3	12·4
U. P. . . .	145·8	132·2	38·2	33·5	8·2	8·0	5·5	6·0	6·0	6·8
Bihar . . .	121·0	105·0	34·2	29·8	10·3	9·1	7·1	5·7	9·6	8·1
Orissa . . .	207·0	187·3	39·1	37·4	12·1	11·8	6·5	6·0	8·7	10·3
Bengal . . .	153·9	138·8	23·7	22·9	10·5	10·8	6·6	5·7	8·4	10·8
C. P. . . .	228·9	207·7	55·9	46·9	12·6	11·5	6·9	6·3	9·1	9·8
Bombay . . .	159·7	145·2	44·2	44·4	9·0	10·1	4·5	5·3	5·4	7·4
Sind . . .	105·3	106·3	13·1	11·9	4·3	4·7	3·3	3·8	4·0	5·2
Madras . . .	185·6	165·0	31·0	30·3	7·4	7·5	4·3	4·6	5·8	7·7
Coorg . . .	134·4	146·0	25·6	22·2	10·3	11·2	9·4	7·2	12·0	17·7
Assam . . .	156·6	142·3	23·4	22·1	10·4	10·1	6·9	6·2	8·8	10·7
Ajmer-Merwara .	184·3	181·5	46·5	41·7	6·4	6·6	4·0	5·4	4·5	8·9

*Ratios have been worked out per 1,000 of live births.

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	8·7	11·0	11·6	12·1	13·2	15·2	32·8	27·8	92·8	87·5
N.-W. F. P. . .	8·4	9·7	11·6	12·5	15·6	16·5	27·3	26·6	56·4	57·1
Punjab . . .	6·3	8·6	7·8	10·2	12·9	13·5	23·4	23·7	65·5	67·1
Delhi . . .	5·6	12·9	6·6	12·5	11·4	17·2	23·4	26·1	82·2	98·5
U. P. . . .	7·8	9·5	10·2	10·9	16·6	13·4	31·8	25·1	96·8	80·0
Bihar . . .	11·6	11·0	14·3	11·9	20·0	15·5	36·4	31·7	86·6	72·6
Orissa . . .	12·8	15·0	17·2	14·9	21·8	16·8	48·6	37·5	108·1	90·2
Bengal . . .	9·9	13·8	13·3	14·4	21·1	18·5	35·7	31·8	85·1	81·6
C. P. . . .	11·2	13·2	15·7	13·9	23·5	17·5	42·3	34·2	116 9	101·6
Bombay . . .	7·7	11·5	10·6	12·7	19·0	15·1	35·9	26·9	122·6	120·2
Sind . . .	4·9	6·3	6·3	7·7	11·0	8·6	19·7	12·1	58·7	44·5
Madras . . .	7·3	9·4	10·2	11·1	17·1	14·0	30·3	23·9	105·8	108·2
Coorg . . .	13·4	19·3	19·1	24·1	32·7	26·4	40·0	35·9	76·2	69·6
Assam . . .	8·2	12·9	11·1	14·3	16·8	16·8	29·2	29·3	73·8	73·1
Ajmer-Merwara . .	6·5	12·1	9·1	12·1	14·5	12·8	33·7	26·8	119·5	97·3

M.—Males. F.—Females

TABLE K.—DEATHS ACCORDING TO AGE AND SEX IN RURAL AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	689,593	572,186	503,053	476,368	159,515	142,283	89,108	74,940	80,777	92,702
N.-W. F. P. . .	4,834	3,368	3,663	3,188	1,340	1,189	810	818	808	780
Punjab . .	90,785	73,047	59,349	52,909	14,073	12,321	8,809	8,437	8,637	8,298
Delhi . . .	993	870	682	732	139	113	73	66	61	71
U. P. . . .	109,377	85,995	105,803	91,448	26,048	21,212	16,242	13,504	13,336	11,413
Bihar . .	65,396	53,643	73,063	67,989	25,540	20,906	15,074	10,731	13,343	11,748
Orissa . . .	25,790	21,968	14,542	14,801	5,080	4,795	2,599	2,236	2,802	3,579
Bengal . . .	120,356	100,419	71,232	70,890	37,325	33,995	20,201	15,531	18,449	27,203
C. P. . . .	65,942	56,844	49,897	43,901	12,419	10,814	5,971	5,035	5,844	6,173
Bombay . . .	47,366	40,611	40,357	41,724	9,770	10,238	4,316	4,478	3,455	4,560
Sind . . .	2,642	2,035	2,418	2,066	1,144	913	729	562	628	559
Madras . . .	135,718	116,131	72,508	72,760	20,196	20,090	10,644	10,602	10,060	13,765
Coorg . . .	258	249	179	159	93	94	75	61	95	127
Assam . . .	19,256	16,297	13,400	13,045	6,209	5,469	3,468	2,809	3,166	4,312
Ajmer-Merwara . .	880	709	960	756	139	134	97	70	93	114

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	191,929	239,224	212,036	198,523	225,226	165,157	235,193	186,730	462,029	432,565
N.-W. F. P. . .	1,735	1,855	1,965	1,796	1,654	1,441	1,714	1,321	2,831	1,923
Punjab . . .	13,927	15,791	13,279	13,578	15,122	12,832	18,047	14,327	45,078	34,622
Delhi . . .	145	213	129	169	154	133	163	109	476	357
U. P. . . .	34,326	35,142	36,996	34,169	42,174	29,549	46,624	33,654	88,327	73,493
Bihar . . .	34,064	32,971	35,646	29,495	33,844	25,135	35,120	31,266	54,711	56,541
Orissa . . .	7,742	10,720	8,478	8,469	7,773	6,740	9,521	9,484	12,799	14,548
Bengal . . .	43,690	63,872	49,323	43,694	49,977	33,870	45,104	34,780	72,663	63,531
C. P. . . .	14,569	17,054	16,230	14,136	17,450	12,482	18,243	15,046	34,637	35,538
Bombay . . .	9,902	14,249	12,048	12,629	14,105	10,190	15,365	11,321	35,255	35,704
Sind . . .	1,727	1,702	1,816	1,644	1,835	1,085	1,632	803	3,245	1,813
Madras . . .	23,358	35,223	28,418	31,079	33,673	26,355	36,521	29,286	100,377	105,554
Coorg . . .	210	255	220	218	216	134	140	119	163	143
Assam . . .	6,309	9,862	7,232	7,163	6,936	4,990	6,594	4,912	10,728	8,164
Ajmer-Merwara .	225	315	256	284	313	221	405	302	739	634

M.—Males. F.—Females.

TABLE L.—DEATHS ACCORDING TO AGE AND SEX IN URBAN AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	104,746	88,153	63,708	63,185	15,123	14,678	8,958	10,302	10,324	15,571
N.-W. F. P. . .	670	487	406	385	108	91	82	105	120	129
Punjab . . .	12,136	10,305	7,098	7,246	1,464	1,512	837	1,231	1,095	1,606
Delhi . . .	1,814	1,581	1,076	1,125	225	256	203	220	223	348
U. P. . . .	26,870	22,552	17,144	17,289	3,512	3,516	1,937	2,740	1,863	3,839
Bihar . .	1,670	1,335	1,398	1,142	565	454	412	355	446	433
Orissa . . .	521	484	294	240	74	101	53	65	79	110
Bengal . . .	7,285	6,241	4,211	3,822	2,262	1,875	1,537	1,210	1,690	1,692
C. P. . . .	8,703	7,317	5,420	5,026	1,100	1,154	702	762	859	1,431
Bombay . . .	16,472	13,976	10,718	10,931	2,130	2,195	1,060	1,261	1,366	1,994
Sind . . .	2,106	1,777	1,173	1,060	232	233	164	177	217	284
Madras . . .	24,894	20,731	13,822	13,908	3,229	3,080	1,802	1,996	2,205	3,447
Coorg . . .	10	12	14	13	5	9	19	4	15	7
Assam . . .	410	336	238	265	102	108	99	77	94	115
Ajmer-Merwara . .	1,185	1,019	701	733	115	94	51	99	52	136

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	28,297	37,475	27,386	25,125	28,738	19,044	29,183	18,436	62,328	59,332
N.-W. F. P. . .	276	309	255	203	234	154	271	152	468	338
Punjab . . .	2,025	2,854	1,707	1,865	1,905	1,399	2,268	1,511	5,563	4,297
Delhi . . .	375	608	322	343	301	285	310	248	606	583
U. P. . . .	4,821	8,818	4,396	5,402	4,917	3,678	5,422	3,664	14,267	12,530
Bihar . .	934	940	971	767	912	551	780	533	1,499	1,437
Orissa . . .	234	244	257	210	241	183	296	197	436	527
Bengal . . .	5,917	4,992	4,841	3,203	4,354	2,970	3,890	2,459	5,227	4,747
C. P. . . .	2,044	3,025	2,014	1,759	2,122	1,272	2,170	1,409	4,273	4,513
Bombay . . .	4,420	6,172	4,782	4,180	5,075	2,925	5,110	2,883	10,046	9,553
Sind . . .	572	693	619	448	703	319	639	248	1,153	964
Madras . . .	6,233	8,219	6,716	6,401	7,472	5,067	7,565	4,902	18,067	19,207
Coorg . .	53	42	93	83	91	24	37	6	28	27
Assam . .	228	251	275	143	228	82	186	96	271	194
Ajmer-Merwara .	165	308	138	168	183	135	289	128	424	416

M.—Males. F.—Females.

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGE TOWNS DURING 1939.

Towns.	Rate *p.m.* of live-births.
N.-W. F. Province.	
Peshawar	132·5
Dera Ismail Khan	101·7
Delhi.	
Delhi City	169·9
New Delhi	85·7
United Provinces.	
Dehra Dun	220·1
Saharanpur	331·5
Hardwar Union	283·0
Muzaffarnagar	197·6
Meerut	161·0
Khurja	249·5
Aligarh	209·7
Hathras	297·9
Muttra	171·0
Agra	183·1
Bareilly	147·3
Budaun	238·9
Moradabad	192·9
Amroha	204·9
Sambhal	235·9
Shahjahanpur	281·6
Pilibhit	230·2
Farrukhabad-*cum*-Fatehgarh	276·2
Etawah	327·4
Cawnpore	301·0
Allahabad	188·2
Jhansi	254·6
Benares	218·4
Mirzapur-Bindhachal	169·9
Jaunpur	162·4
Gorakhpur	213·1
Lucknow	212·2
Fyzabad-Ajodhya	160·5
Bahraich	150·1
Bengal Presidency.	
Asansol	98·1
Bankura	84·6
Hooghly-Chinsura	112·1
Serampur	159·3
Howrah	240·8
South Suburban	117·9
Baranagar	163·7
Titagarh	182·9
Naihati	103·7
Bhatpara	222·6
Calcutta	205·4
Sirajganj	122·6
Dacca	162·7
Narayanganj	209·3
Mymensingh	159·8
Barisal	146·1
Chittagong	149·3
Central Provinces.	
Nagpur	226·2
Jubbulpore	264·4
Saugor	277·0
Khandwa	261·7
Burhanpur	180·7
Raipur	194·7
Bilaspur	227·1
Amraoti	161·7
Akola	211·4
Bombay Presidency.	
Bombay	212·2
Jalgaon	163·9
Dhulia	110·4
Surat	246·9
Broach	138·0
Nadiad	242·1
Godhra	184·4
Ahmedabad	267·4
Ahmednagar	140·0
Poona	229·7
Nasik	254·5
Malegaon	224·5
Bandra	149·2
Kurla	130·5
Belgaum	103·4
Gadag-Betigeri	287·9
Bijapur	82·0
Sholapur	186·7
Sind.	
Karachi	135·7
Hyderabad	182·4
Sukkur	71·4
Shikarpur	179·6

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGE TOWNS DURING 1939—*contd.*

Towns.	Rate *p.m.* of live-births.	Towns.	Rate *p.m.* of live-births.
Madras Presidency.		*Madras Presidency*—contd.	
Bellary	199·4	Tellicherry	105·6
Adoni	131·1	Nellore	201·2
Conjeeveram	177·6	Vellore	168·1
Saidapet	233·1	Virudhunagar	167·5
Coimbatore	134·3	Srivilliputtur	168·0
Erode	160·9	Salem	149·7
Cocanada	225·9	Cuddalore	148·4
Rajahmundry	174·2	Tanjore	157·1
Guntur	239·0	Kumbakonam	131·1
Tenali	203·0	Negapatam	170·1
Bezwada	234·7	Mayavaram	129·9
Masulipatam	212·2	Tuticorin	216·9
Madras	241·6	Tinnevelly	231·1
Madura	171·3	Palamcottah	162·1
Dindigul	163·9	Trichinopoly	169·2
Calicut	130·9	Vizagapatam	204·8
Palghat	175·2	Vizianagram	18·8
Cannanore	114·1		

TABLE N.—INFANTILE MORTALITY IN RURAL AND URBAN AREAS.

	Rural.		Urban.	
	Deaths.	Rate p. m. of live-births.	Deaths.	Rate p. m. of live-births.
BRITISH INDIA	1,261,779	150·7	192,899	198·6
N.-W. F. P.	8,202	133·0	1,157	115·3
Punjab	163,832	167·0	22,441	171·7
Delhi	1,863	181·6	3,395	157·0
U. P.	195,372	129·6	49,422	199·7
Bihar	119,039	113·2	3,005	114·0
Orissa	47,758	197·9	1,005	176·2
Bengal	220,775	145·8	13,526	161·7
C. P.	122,786	219·8	16,020	210·0
Bombay	87,977	143·9	30,448	185·3
Sind	4,677	88·3	3,883	138·9
Madras	251,849	164·2	45,625	283·2
Coorg	507	157·9	22	38·5
Assam	35,553	150·8	746	112·4
Ajmer-Merwara	1,589	134·0	2,204	248·6

TABLE O.—CRUDE AND STANDARDISED DEATH RATES PER MILLE (DIRECT METHOD) FOR DIFFERENT PROVINCES IN INDIA. THE 1931 CENSUS POPULATION DISTRIBUTION FOR INDIA HAS BEEN TAKEN AS THE STANDARD.

		1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.
N.-W. F. P.	Standardised	20·5	20·3	21·2	20·7	18·8	17·1	20·4	21·8	17·8
	Crude	20·2	19·7	20·8	20·4	18·6	17·0	19·9	21·3	17·3
Punjab	Standardised	23·4	22·0	24·5	24·6	21·1	20·5	19·2	20·8	20·1
	Crude	25·9	24·2	27·1	26·3	23·3	22·0	23·1	23·4	22·2
Delhi	Standardised	23·4	23·9	31·8	30·6	28·9	25·6	23·4	22·8	22·9
	Crude	23·7	24·2	31·9	28·5	28·7	23·8	23·8	23·4	23·1
U. P.	Standardised	26·1	21·4	17·2	25·7	23·1	21·2	19·4	23·2	20·6
	Crude	26·9	22·0	18·2	25·6	23·6	21·2	19·8	23·6	20·9
Bihar	Standardised	26·0†	19·9†	20·9†	26·2†	23·6†	21·3	20·7	21·4	20·9
	Crude	26·5†	20·4†	21·6†	25·1†	24·1†	20·5	21·0	21·8	21·0
Orissa	Standardised	..	..	..	..	..	28·2	27·0	28·5	26·8
	Crude	..	..	..	..	..	27·0	27·6	28·8	27·3
Bengal	Standardised	23·5	21·8	25·0	23·5	22·7	24·0	24·0	26·3	21·5
	Crude	22·2	20·3	23·7	23·2	22·1	23·7	23·6	25·0	20·7
C. P.	Standardised	31·8	23·5	23·0	*	*	31·1	28·4	35·2	29·0
	Crude	35·4	26·5	25·7	35·5	32·6	32·4	30·1	37·6	30·7
Bombay	Standardised	23·5‡	22·4‡	23·9‡	20·9‡	24·2‡	26·6	24·8	27·1	24·1
	Crude	23·7‡	22·7‡	24·1‡	24·5‡	24·4‡	26·0	25·4	27·9	25·0
Sind	Standardised	..	..	..	..	..	12·3	13·0	13·2	12·1
	Crude	..	..	..	..	..	11·5	11·1	11·3	10·4
Madras	Standardised	21·3	19·8	21·3	24·3	22·3	22·1	20·9	20·8	21·6
	Crude	23·6	21·6	22·9	23·9	23·6	22·0	22·3	21·6	22·9

* Figures not available.
† Including Orissa.
‡ Including Sind.

TABLE O.—*contd.*

		1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939
Coorg	Standardised	25·7	24·9	26·5	25·0	24·6	25·6	29·8	26·6	24·8
	Crude	23·8	23·3	24·0	23·1	22·9	23·7	27·2	24·3	22·8
Assam	Standardised	19·7	19·4	20·6	19·6	21·4	19·5	21·8	22·1	20·2
	Crude	18·6	18·7	19·8	19·0	20·5	18·6	20·9	20·9	19·2
Ajmer-Merwara	Standardised	30·0	24·5	27·4	28·9	27·8	24·2	29·3	25·0	23·5
	Crude	30·1	24·8	28·1	28·7	28·4	24·1	29·8	25·1	23·4

TABLE P—VITAL STATISTICS FOR INDIAN STATES.

State.	Estimated population on 30th June 1939.	Births.	Birth rate *per mille.*	Deaths.	Death rate *per mille.*	Deaths under one year.	Infantile mortality per 1000 births.
Hyderabad State	16,073,123	168,166	10·5	145,065	9·0	†	†
Mysore State	7,039,308	138,120	19·6	98,759	14·0	15,068	109·1
Jammu and Kashmir	3,917,679	86,913	22·2	63,533	16·2	8,474	97·5
Madras States.							
Sandur	15,183	416	27·4	282	18·6	69	165·9
Banganapallee	41,397	1,383	33·4	979	23·6	63	45·6
Cochin*	1,393,299	18,944	13·6	13,720	9·8	1,377	72·7
Pudukkottai	378,927	7,211	19·0	5,961	15·7	579	80·3
Travancore	6,004,233	119,257	19·9	60,477	10·1	11,069	92·8
Rajputana States.							
Jaipur	2,875,917	19,893	6·9	15,673	5·4	3,791	190·6
Jodhpur (City only)	112,449	3,005	26·7	2,382	21·2	547	182·0
Mewar	1,733,517	18,326	10·6	10,384	6·0	2,439	133·1
Kotah	732,254	26,713	36·5	19,024	26·0	†	†
Bharatpur	479,054	14,314	29·9	9,042	18·9	1,996	139·4
Dholpur	275,653	4,763	17·3	2,603	9·4	†	†
Dungarpur	260,269	1,080	4·1	1,867	7·2	134	124·1
Banswara	254,056	2,344	9·2	2,825	11·1	11	4·5
Bundi	241,430	5,354	22·2	3,216	13·3	803	150·0
Sirohi	241,435	367	1·5	238	1·0	40	109·0
Karauli	146,192	1,762	12·1	2,099	14·4	423	240·1
Jhalawar	117,648	533	4·5	418	3·6	74	138·8
Kishangarh	92,419	2,060	22·3	1,539	16·7	467	226·7
Partabgarh	84,397	1,849	21·9	2,070	24·5	115	62·2
Jaisalmer	83,422	765	9·2	698	8·4	†	†
Palanpur	287,083	3,653	12·7	3,248	11·3	†	†
Tonk	341,910	10,628	31·1	9,443	27·6	1,127	106·0
Shahpura	59,316	1,369	23·1	972	16·4	164	119·8
Lawa Chiefship	3,232	57	17·6	14	4·3	3	52·6
Kushalgarh Chiefship	40,897	165	4·0	292	7·1	33	200·0
Bikaner City	99,691	1,104	11·1	821	8·2	197	178·4
Eastern States Agency.							
Athgarh	56,645	1,680	29·7	2,041	36·0	488	290·5
Baramba	51,569	2,235	43·3	1,487	28·8	529	236·7
Baudh	144,278	6,503	45·1	4,000	27·7	1,327	204·1
Bonai	90,192	3,571	39·6	2,694	29·9	901	252·3
Daspalla	50,812	2,194	43·2	1,686	33·2	566	258·0
Hindol	57,461	2,291	39·9	1,492	26·0	580	253·2
Dhenkanal	326,526	10,926	33·5	8,365	25·6	2,722	249·1
Khandpara	89,295	4,092	45·8	2,635	29·5	934	228·3
Kharsawan	209,554	1,199	5·7	864	4·1	117	97·6
Narsingpur	47,441	1,933	40·7	1,383	29·2	435	225·0
Nayagarh	158,709	7,005	44·1	3,129	19·7	824	117·6
Nilgiri	71,403	1,686	23·6	1,507	21·1	287	170·2
Pal-Lahara	31,461	1,229	39·1	832	26·4	320	260·4
Rairakhol	39,447	3,758	95·3	3,092	78·4	1,065	283·4
Ranpur	53,068	1,486	28·0	1,094	20·6	305	205·2
Sonepur	247,227	8,872	35·9	5,305	21·5	2,055	231·6
Tigiria	29,228	918	31·4	988	33·8	291	317·0
Mayurbhanj	1,002,343	31,426	31·4	21,251	21·2	3,849	122·5
Surguja	562,842	9,651	17·1	8,109	14·4	1,095	113·5
Athmallik	68,039	3,434	50·5	2,388	35·1	1,686	491·0
Bamra	164,655	6,336	38·5	5,271	32·0	1,494	235·8

†Figures not available.

*Figures for Cochin State are for the year 1115 Malayalam Era.

State.	Estimated population on 30th June 1939.	Births.	Birth rate *per mille.*	Deaths.	Death rate *per mille.*	Deaths under one year.	Infantile mortality per 1000 births.
Eastern States Agency— contd.							
Gangpur	396,174	13,552	34·2	9,634	24·3	2,266	167·2
Keonjhar	528,201	19,475	36·9	12,742	24·1	3,183	163·4
Seraikela	167,133	3,033	18·1	2,227	13·3	327	107·8
Talcher	85,277	717	8·4	516	6·1	128	178·5
Cooch Behar	589,514	13,478	22·9	13,472	22·8	1,767	131·1
Tripura	447,461	19,944	44·6	9,972	22·3	2,493	125·0
Bastar	575,204	18,910	32·9	11,798	20·5	2,760	146·0
Changbhakar	24,572	440	17·9	458	18·6	35	79·5
Chhuikhadan	36,293	1,219	33·6	920	25·3	370	303·5
Jashpur	226,648	6,273	27·7	4,271	18·8	975	155·4
Kalahandi	595,200	15,430	25·9	13,847	23·3	3,805	246·6
Kanker	145,445	5,191	35·7	2,942	20·2	716	137·9
Kawardha	82,020	3,220	39·3	2,730	33·3	1,014	314·9
Khairagarh	185,225	5,785	31·2	4,345	23·5	987	170·6
Korea	100,613	2,512	25·0	2,019	20·1	509	202·6
Nandgaon	209,738	7,958	37·9	6,043	28·8	2,192	275·4
Patna	627,126	29,900	47·7	16,979	27·1	5,804	194·1
Raigarh	307,519	10,114	32·9	6,517	21·2	1,627	160·9
Sakti	54,243	1,927	35·5	1,308	24·1	474	246·0
Sarangarh	138,294	4,079	29·5	2,856	20·7	653	160·1
Udaipur	119,913	3,659	30·5	2,594	21·6	664	181·5
Central India Agency.							
Rewa	1,742,378	725	0·4	829	0·5	210	289·7
Orchha	339,421	9,588	28·2	7,462	22·0	*	...
Datia	167,313	2,301	13·8	784	4·7	*	...
Samthar	33,382	911	27·3	481	14·4	*	...
Panna	224,238	2,341	10·4	2,038	9·1	*	...
Charkhari	117,806	1,839	15·6	1,107	9·4	*	...
Ajaigarh	86,815	2,271	26·2	1,424	16·4	*	...
Bijawar	119,292	2,574	21·6	1,810	15·2	*	...
Baoni	18,630	740	39·7	503	27·0	*	...
Chhatarpur	156,865	5,107	32·6	3,188	20·3	*	...
Baraundha	16,203	213	13·1	374	23·1	*	...
Nagod	79,941	2,779	34·8	1,907	23·9	*	...
Maihar	71,033	1,925	27·1	1,325	18·7	*	...
Alipura Jagir	15,929	549	34·5	380	23·9	*	...
Banka Pahari Jagir	1,068	56	52·4	29	27·2	*	...
Beri Jagir	4,030	95	23·6	54	13·4	*	...
Bhaisondha Jagir	4,164	159	38·2	72	17·3	*	...
Bihat Jagir	4,380	156	35·6	124	28·3	*	...
Bijna Jagir	1,663	57	34·3	59	35·5	*	...
Dhurwai Jagir	2,154	100	46·4	85	39·5	*	...
Garrouli Jagir	9,902	157	15·9	81	8·2	*	...
Jaso Jagir	8,324	118	14·2	63	7·6	*	...
Jigni Jagir	3,660	167	45·6	123	33·6	*	...
Kamta Rajaula Jagir	1,163	37	31·8	24	20·6	*	...
Kothi Jagir	22,538	151	6·7	230	10·2	*	...
Lughasi Jagir	6,200	346	55·8	233	37·6	*	...
Naigawan Rabi Jagir	2,551	122	47·8	78	30·6	*	...
Pahra Jagir	3,756	68	18·1	65	17·3	*	...
Paldeo Jagir	7,972	291	36·5	139	17·4	*	...
Sarila State	5,972	334	55·9	224	37·5	*	...
Sohawal State	45,620	591	13·0	569	12·5	*	...
Taraon Jagir	3,352	31	9·2	11	3·3	*	...
Tori Fetahpur Jagir	4,778	184	38·5	99	20·7	*	...
Bhopal	761,213	20,489	26·9	21,580	28·3	5,686	277·5
Dewas Senior Branch	8,588	777	90·5	1,269	147·8	*	...
Rajgarh	151,708	2,145	14·1	2,157	14·2	*	...
Pathari	2,557	111	43·4	89	34·8	46	414·4
Makrai	17,786	561	31·5	749	42·1	200	356·5
Narsingarh	124,248	1,465	11·8	1,541	12·4	434	296·2

* Figures not available.

State.	Estimated population on 30th June 1939.	Births.	Birth rate *per mille.*	Deaths.	Death rate *per mille.*	Deaths under one year.	Infantile mortality per 1000 births.
Central India Agency—contd.							
Kurwai	23,934	286	11·9	354	14·8	73	255·2
Khilchipur	50,200	695	13·8	797	15·9	115	165·5
Mohammadgarh	2,666	70	26·3	76	28·5	6	85·7
Ratlam	125,513	2,089	16·6	1,855	14·8	445	213·0
Sitamau	29,980	600	20·0	451	15·0	*	...
Barwani	158,577	2,591	16·3	2,041	12·9	*	...
Alirajpur	112,463	1,247	11·1	1,249	11·1	187	150·0
Jobat	21,702	308	14·2	296	13·6	*	...
Piploda	9,510	196	20·6	229	24·1	25	127·6
Sailana	42,123	487	11·6	511	12·1	65	133·5
Bakhatgarh	8,674	124	14·3	206	23·7	*	...
Kathiawara	6,846	148	21·6	83	12·1	16	108·1
Bharudpura	3,301	11	3·3	12	3·6	1	90·9
Nimkhera	7,179	61	8·5	152	21·2	*	...
Baroda and Gujarat States Agency.							
Balasinor	59,608	2,552	42·8	1,195	20·0	396	155·2
Bansda	56,040	955	17·0	971	17·3	127	133·0
Baria	177,879	1,954	11·0	1,673	9·4	*	...
Baroda	2,706,749	106,222	39·2	62,379	23·0	14,052	132·3
Cambay	101,136	3,516	34·8	2,326	23·0	661	188·0
Chhota Udepur	160,423	3,264	20·3	2,141	13·3	120	36·8
Dharampur	126,081	3,131	24·8	2,113	16·8	142	45·4
Jawhar	63,594	2,187	34·4	1,877	29·5	306	139·9
Lunawada	105,187	1,570	14·9	1,465	13·9	115	73·2
Rajpipla	237,468	7,536	31·7	5,520	23·2	1,259	167·1
Sachin	23,882	708	29·6	527	22·1	79	111·6
Sant	93,998	2,586	27·5	1,187	12·6	190	73·5
Agar	3,586	45	12·5	90	25·1	23	511·1
Bhaderwa	12,281	315	25·6	220	17·9	45	142·9
Chhaliar	3,179	105	33·0	70	22·0	25	238·1
Gad Boriad	14,371	200	13·9	147	10·2	63	315·0
Jambughoda	12,927	487	37·7	224	17·3	42	86·2
Kadana	19,385	581	30·0	330	17·5	51	87·8
Mandwa	6,678	104	15·6	116	17·4	23	221·2
Palasni	3,166	92	29·1	43	13·6	13	141·3
Sihora	5,084	143	28·1	100	19·7	24	167·8
Sanor	2,073	80	38·6	50	24·1	16	200·0
Surgana	15 520	311	20·0	201	13·0	27	86·
Uchad	3,754	110	29·3	58	15·5	22	200·0
Umeta	7,315	240	32·8	123	16·8	42	175·0
Vajiria	5,696	189	33·2	143	25·1	35	185·2
Sanjeli	9,150	324	35·4	125	13·7	22	67·9
Pandu Mewas	23,140	601	26·0	422	18·2	64	106·5
Kolhapur and Deccan States.							
Kolhapur	1,059,979	37,823	35·7	24,335	23·0	3,079	81·4
Akalkot	102,072	3,552	34·8	3,200	31·4	235	66·2
Bhor	150,821	5,799	38·4	3,277	21·7	829	143·0
Jamkhandi	125,190	4,610	36·8	2,732	21·8	646	140·1
Kurundwad (Senior)	48,737	1,989	40·8	1,011	20·7	260	130·7
Kurundwad (Junior)	44,000	1,944	44·2	1,272	28·9	266	136·8
Miraj (Senior)	103,426	2,807	27·1	2,128	20·6	346	123·3
Miraj (Junior)	45,736	1,603	35·0	940	20·6	200	124·8
Mudhol	65,074	2,378	36·5	1,245	19·1	181	76·1
Phaltan	65,694	2,671	40·7	1,516	23·1	427	159·9
Ramdurg	36,707	1,220	33·2	777	21·2	204	167·2
Sangli	289,395	10,501	36·3	5,903	20·4	1,469	139·9
Sawantwadi	250,714	7,939	31·7	4,261	17·0	758	95·5
Savanur	23,228	904	38·9	470	20·2	90	99·6
Aundh	86,465	3,428	39·6	1,815	21·0	557	162·5

*Figures not available.

State.	Estimated population on 30th June 1939.	Births.	Birth rate *per mille.*	Deaths.	Death rate *per mille.*	Deaths under one year.	Infantile mortality per 1000 births.
Western India States Agency.							
Nawanagar	462,391	3,125	6·8	1,042	2·3	122	39·0
Radhanpur	72,814	2,360	32·4	1,589	21·8	309	130·9
Morvi	131,080	2,608	19·9	2,543	19·4	471	180·6
Gondal	238,158	12,055	50·6	6,784	28·5	2,555	211·9
Jafrabad	12,989	559	43·0	445	34·3	111	198·6
Wankaner	50,455	2,700	53·5	1,280	25·4	465	172·2
Palitana	65,667	3,511	53·5	1,924	29·3	493	140·4
Dhrol	30,971	1,454	46·9	629	20·3	201	138·2
Limbdi	43,976	2,020	45·9	1,016	23·1	261	129·2
Rajkot	87,662	2,002	22·8	1,808	20·6	771	385·1
Wadhwan	46,482	1,936	41·7	998	21·5	250	129·1
Rajkot Civil Station	13,159	807	61·3	325	24·7	83	102·9
U. P. States.							
Tehri (Garhwal)	596,467	10,458	17·7	6,508	10·9	1,831	175·1
Benares	414,857	10,768	26·0	6,835	16·5	1,286	119·4
Rampur	474,344	9,474	20·0	7,028	14·8	1,888	199·3
Punjab States.							
Patiala	1,730,337	66,469	38·4	42,120	24·3	10,722	161·3
Nabha	307,774	7,783	25·3	5,853	19·0	300	38·5
Jind	338,418	14,939	44·1	10,671	31·5	2,163	144·8
Bahawalpur	1,154,129	23,321	20·2	10,568	9·2	*	*
Sirmoor	155,335	2,218	14·3	2,530	16·3	331	149·2
Bilaspur	103,486	2,805	27·1	2,886	27·9	579	206·4
Mandi	226,148	6,739	29·8	5,023	22·2	885	131·3
Kapurthala	343,824	9,622	28·0	4,690	18·6	967	100·5
Malerkotla	85,364	2,229	26·1	1,568	18·4	324	145·4
Faridkot	175,781	8,920	50·7	4,908	27·9	1,386	155·4
Chamba	151,037	1,926	12·8	1,734	11·5	8	4·2
Pataudi	19,523	912	46·7	621	31·8	330	361·8
Kalsia	61,915	2,253	36·4	1,660	26·8	371	164·7
Suket	61,808	1,284	20·8	1,446	23·4	126	98.1
Nalagarh	52,640	1,024	19·5	1,072	20·4	146	142·6

*Figures not available.

Appendix II

TABLE A.—DEATHS AND RATES *PER MILLE* FROM CERTAIN CAUSES OR GROUPS OF CAUSES OF MORTALITY.

Province.	Cholera.		Smallpox.		Plague.		Fevers.		Dysentery and Diarrhœa.		Respiratory Diseases.		Other causes.		Total.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA .	97,566	0·4	48,103	0·2	26,257	0·1	3,613,376	13·0	260,300	0·9	499,339	1·8	1,620,293	5·8	6,165,234	22·2
N.-W. F. P. .	...	...	675	0·3	...	...	34,564	13·5	312	0·1	3,243	1·3	5,482	2·1	44,276	17·3
Punjab . .	19	0·0	4,311	0·2	...	...	408,676	15·0	10,489	0·4	79,775	2·9	99,922	3·7	603,192	22·2
Delhi . .	96	0·1	606	0·8	...	...	4,470	6·1	1,081	1·5	5,055	6·9	5,592	7·7	16,900	23·1
U. P. . .	27,732	0·5	10,205	0·2	21,662	0·4	858,401	16·1	17,962	0·3	41,398	0·8	140,559	2·6	1,118,009	20·9
Bihar . .	16,771	0·5	8,362	0·2	1,938	0·1	601,893	16·9	4,141	0·1	8,113	0·1	108,547	3·1	744,765	21·0
Orissa . .	11,141	1·5	3,282	0·5	...	...	101,344	13·9	17,403	2·4	4,696	0·6	61,446	8·4	199,312	27·3
Bengal . .	33,221	0·6	7,029	0·1	2	0·0	687,587	13·1	54,453	1·0	88,458	1·7	219,780	4·2	1,090,530	20·7
C. P. . . .	1,661	0·1	762	0·0	852	0·1	300,322	17·9	30,435	1·8	44,131	2·6	137,137	8·2	515,300	30 7
Bombay . .	1,786	0·1	6,769	0·3	1,472	0·1	168,788	8·5	25,567	1·3	109,922	5·5	180,583	9·2	494,887	25·0
Sind . . .	3	0·0	565	0·1	...	...	23,973	5·5	1,150	0·3	8,444	2·0	10,644	2·5	44,779	10·4
Madras . .	2,115	0·0	3,120	0·1	324	0·0	307,942	6·3	84,906	1·8	102,130	2·1	610,744	12·6	1,111,281	22·9
Coorg. . .	...	...	1	0·0	5	0·0	2,864	17·5	103	0·6	170	1·0	607	3·7	3,750	22·8
Assam . .	3,020	0·4	2,197	0·3	...	...	103,892	12·0	11,641	1·4	5,981	0·7	37,388	4·4	164,119	19·2
Ajmer-Merwara .	1	0·0	219	0·4	2	0·0	8,570	14 1	657	1·1	2,823	4·7	1,862	3·1	14,134	23·4

p. m.—*per mille*.

TABLE B.—DEATHS AND RATES *PER MILLE* FROM CERTAIN CAUSES OR GROUPS OF CAUSES OF MORTALITY IN RURAL AND URBAN AREAS.

Province.	Cholera.				Smallpox.				Plague.			
	Rural.		Urban.		Rural.		Urban.		Rural.		Urban.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA	90,621	0·4	6,945	0·3	36,898	0·1	11,205	0·4	24,156	0·1	2,101	0·1
N.-W. F. P.	...	...		...	599	0·3	76	0·2	...	...	...	...
Punjab	17	0·0	2	0·0	3,381	0·1	930	0·3	...	...	...	...
Delhi	2	0·0	94	0·2	13	0·1	593	1·2	...	...	...	...
U. P.	25,289	0·5	2,443	0·4	7,410	0·2	2,795	0·5	19,985	0·4	1,677	0·3
Bihar	16,305	0·5	466	0·3	7,790	0·2	572	0·4	1,830	0·1	108	0·1
Orissa	11,037	1·6	104	0·5	3,079	0·4	203	0·9	...	...	...	...
Bengal	30,008	0·6	3,213	0·9	3,890	0·1	3,139	0·9	...	...	2	0·0
C. P.	1,494	0·1	167	0·1	490	0·0	272	0·1	751	0·1	101	0·1
Bombay	1,493	0·1	293	0·1	5,347	0·3	1,422	0·4	1,322	0·1	150	0·0
Sind	3	0·0	...	...	434	0·1	131	0·2	...	...	...	...
Madras	1,969	0·0	146	0·0	2,235	0·1	885	0·2	261	0·0	63	0·0
Coorg	...	...	...	...	1	0·0	...	...	5	0·0	...	...
Assam	3,004	0·4	16	0·1	2,146	0·3	51	0·2	...	...	...	...
Ajmer-Merwara	...	...	1	0·0	83	0·2	136	0.7	2	0·0	...	...

p. m.—*per mille.*

TABLE B.—DEATHS AND RATES *PER MILLE* FROM CERTAIN CAUSES OR GROUPS OF CAUSES OF MORTALITY IN RURAL AND URBAN AREAS—*contd.*

Province.	Fevers.				Dysentery and Diarrhœa.				Respiratory diseases.			
	Rural.		Urban.		Rural.		Urban.		Rural.		Urban.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA	3,412,844	13·5	200,532	7·6	201,662	0·8	58,638	2·2	344,309	1·4	155,030	5·9
N.-W. F. P.	32,336	14·6	2,228	6·4	120	0·1	192	0·6	2,002	0·9	1,241	3·6
Punjab	379,266	16·1	29,410	8·3	6,141	0·3	4,348	1·2	63,466	2·7	16,309	4·6
Delhi	3,538	15·7	932	1·8	198	0·9	883	1·7	963	4·3	4,092	8·1
U. P.	791,440	16·6	67,051	11·1	5,280	0·1	12,682	2·1	8,637	0·2	32,761	5·4
Bihar	593,667	17·4	8,226	5·8	3,330	0·1	811	0·6	2,471	0·1	642	0·5
Orissa	99,748	14·1	1,596	7·1	16,746	2·4	657	2·9	4,304	0·6	392	1·7
Bengal	673,741	13·7	13,846	3·9	46,985	1·0	7,468	2·1	71,160	1·4	17,298	4·9
C. P.	279,316	18·7	21,006	11·3	25,796	1·7	4,639	2·5	35,320	2·4	8,811	4·8
Bombay	144,867	9·0	23,921	6·4	19,029	1·2	6,539	1·7	74,510	4·6	35,412	9·4
Sind	21,465	6·1	2,508	3·3	177	0·1	973	1·3	4,117	1·2	4,327	5·6
Madras	280,375	6·3	27,567	6·9	66,621	1·5	18,285	4·6	71,785	1·6	30,345	7·6
Coorg	2,808	18·1	56	6·0	75	0·5	28	3·0	73	0·5	97	10·3
Assam	102,872	12·3	1,020	4·7	11,156	1·3	485	2·2	5,488	0·7	493	2·3
Ajmer-Merwara	7,405	17·8	1,165	6·2	9	0·0	648	3·5	13	0·0	2,810	15·0

p. m.—*per mille.*

TABLE C.—DEATHS FROM CHOLERA FROM 1905 TO 1939.

Year.	British India.	N.-W. F. P.	Punjab.	Delhi.	U. P.	Bihar.	Orissa.	Bengal.	C. P.	Bombay.	Sind.	Madras.	Coorg.	Assam.	Burma.	Indian States. Ajmer-Merwara.	Rajputana.	Central India.	Hyderabad.	Mysore
1905—1909.	2,371,365	3,545	20,354	324	399,144	555,350		677,816	61,011	89,644		422,658	410	95,927	44,897	285	5,926	13,366	2,227	16,600
1910—1914.	1,767,770	5,421	17,643	503	331,970	394,482		451,025	78,258	96,929		289,444	254	81,967	19,800	74	6,219	25,896	9,210	17,672
1915—1919.	2,098,749	5,557	25,030	242	346,359	598,862		453,864	110,998	97,606		321,297	191	99,088	38,713	942	7,970	15,652	26,647	13,062
1920—1924	1,069,136	4,390	22,843	781	228,540	229,512		276,455	72,680	25,793		131,845	34	54,379	21,805	79	3,911	6,826	9,254	8,023
1925	115,645	116	3,049	50	7,653	17,336		34,276	124	57		44,815	4	6,233	1,932	...	...	43	22	...
1926	138,151	...	87	18	6,166	27,268		59,106	4,565	73		24,407	2	10,275	6,182	2		269	26	6
1927	304,710	2	11,286	16	28,285	49,022		118,377	16,311	26,153		35,334	...	15,392	4,528	4	1,357	2,5 4	8,913	1,36
1928	351,305	...	2,034	34	44,941	77,103		136,245	12,198	6,881		57,677	...	6,915	7,209	68	1,371	7,520	4,314	418
1929	295,434	30	2,309	193	50,924	104,034		81,090	6,168	9,084		25,846	1	7,765	7,970	20	722	1,155	450	140
1930	337,322	449	1,181	8	61,334	155,215		54,963	23,250	15,142		18,746	...	6,332	661	41	2,101	11,165	18,369	535
1931	220,909	105	391	61	31,118	40,943		79,073	14,135	13,646		30,232	116	5,523	534	32	294	1,411	5,653	6,385
1932	67,219	70	614	4	9,734	9,348		33,910	854	1,353		5,278	...	4,971	1,082	1	122	168	71	83
1933	68,318	...	160	...	1,915	17,514		29,242	2,152	7,797		3,851	...	5,508	179	...	35	642	4,838	90
1934	199,708	...	178	19	31,903	57,289		50,742	27,329	11,362		18,158	1	1,904	822	1	969	4,471	4,95	346
1935	217,162	245	714	181	10,412	64,876		59,605	20,140	11,235		35,456	...	7,436	6,858	4	33	1,043	10,563	1,407
1936	159,720	68	1,762	48	6,793	6,070	7,977	76,100	10,691	11,304	8	34,117	2	3,816	984	21	776	604	9,065	1,793
1937	*99,054	24	105	...	6,341	13,949	5,076	32,710	1,107	10,992	2	23,307	1	5,440	†	...	..	1,042	2,351	4,842
1938	*236,143	740	5,760	182	70,622	14,750	1,309	71,133	45,332	3,313	343	10,252	...	11,907	†	...	2,070	11,702	8,687	880
1939	*97,586	...	19	96	27,732	16,771	11,141	33,221	1,661	1,786	3	2,115	...	3,020	†	1	201	729	3,964	533

*Excluding Burma.

†Burma was separated from India since April 1937.

TABLE D.—DEATHS AND RATES *PER MILLE* FROM CHOLERA IN RURAL AND URBAN AREAS.

	Deaths.			Rate *per mille*			Number of anti-cholera inoculations.	Total villages.	Number infected.
	Rural.	Urban.	Total.	Rural.	Urban.	Total.			
BRITISH INDIA	90,621	6,945	97,566	0·4	0·3	0·4	5,355,457	451,187	24,023
N.-W. F. P.	...	...	...	...	...	...	274	2,802	...
Punjab	17	2	19	0·0	0·0	0·0	196,858	34,852	4
Delhi	2	94	96	0·0	0·2	0·1	39,039	309	1
U. P.	25,289	2,443	27,732	0·5	0·4	0·5	821,716	105,640	4,302
Bihar	16,305	466	16,771	0·5	0·3	0·5	913,715	67,879	3,769
Orissa	11,037	104	11,141	1·6	0·5	1·5	634,244	19,466	1,989
Bengal	30,008	3,213	33,221	0·6	0·9	0·6	1,947,125	86,361	11,290
C. P.	1,494	167	1,661	0·1	0·1	0·1	251,721	39,246	472
Bombay	1,493	293	1,786	0·1	0·1	0·1	293,160	21,455	478
Sind	3	...	3	0·0	...	0·0	39	9,095	1
Madras	1,969	146	2,115	0·0	0·0	0·0	143,549	34,830	525
Coorg	...	...	...	...	...	...	251	298	...
Assam	3,004	16	3,020	0·4	0·1	0·4	113,727	28,333	1,192
Ajmer-Merwara	...	1	1	..	0·0	0·0	38	621	...

TABLE E.—DEATHS FROM CHOLERA BY MONTHS.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
BRITISH INDIA	8,009	3,845	5,772	7,673	4,873	5,851	11,563	13,857	10,964	9,980	9,118	6,061
N.-W. F. P.	...	...	...	...	...	...	...	...	...	...	...	...
Punjab	...	...	...	...	...	...	...	11	7	...	1	...
Delhi	...	...	...	1	...	...	...	...	1	78	13	3
U. P.	168	55	118	860	1,159	3,021	6,448	7,052	4,677	2,760	1,094	320
Bihar	108	130	376	1,041	671	840	1,778	3,273	2,445	2,321	2,869	919
Orissa	43	111	95	213	206	215	919	961	2,029	2,388	1,951	2,010
Bengal	5,034	2,302	4,686	5,108	2,521	1,577	1,805	1,722	1,134	1,928	2,842	2,562
C. P.	51	24	32	72	55	16	32	335	479	361	180	24
Bombay	154	100	48	51	101	48	481	446	163	103	71	20
Sind	...	...	...	...	...	...	...	...	3	...	...	...
Madras	981	661	138	37	16	14	64	23	15	3	70	93
Coorg	...	...	...	...	...	...	...	...	...	...	...	...
Assam	1,470	462	279	290	144	120	35	34	11	38	27	110
Ajmer-Merwara	...	...	...	...	...	...	1	...	...	...	...	...

TABLE F.—DEATHS FROM PLAGUE BY MONTHS.

(i) British Provinces.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.	No. of anti-plague inoculations.
GRAND TOTAL .	3,039	4,846	8,850	6,447	2,003	440	604	1,384	2,647	2,355	1,866	2,754	37,235	...	...
BRITISH INDIA .	2,405	4,153	8,005	5,973	1,701	264	92	244	638	718	679	1,385	26,257	0·1	481 971
N.-W. F. P. . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
Punjab . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
Delhi . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
U. P. . . .	2,037	3,635	7,086	5,313	1,595	217	35	118	183	220	303	920	21,662	0·4	262,843
Bihar . . .	157	226	644	454	77	35	34	26	73	71	19	122	1,938	0·1	43,081
Orissa . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal . . .	...	...	1	1	...	...	...	...	...	...	...	...	2	0·0	*
C. P. . . .	104	192	210	173	8	...	...	17	38	39	43	28	852	0·1	34,611
Bombay . . .	33	21	29	25	7	2	16	77	331	364	294	273	1,472	0·1	80,200
Sind . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Madras . . .	74	79	35	6	13	5	7	6	13	24	20	42	324	0·0	59,757
Coorg . . .	...	...	...	1	1	3	...	...	...	...	...	...	5	0·0	1,479
Assam . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ajmer-Merwara .	...	...	...	...	...	2	...	...	...	...	...	...	2	0·0	...

*Not available

(ii) Indian States* and Agencies.

Benares State .	45	115	273	236	38	...	...	19	14	14	26	36	816
Kolhapur State .	5	28	26	9	2	1	35	32	55	19	29	17	253
Akalkot State .	...	...	...	...	...	...	...	12	138	114	137	266	667
Jamkhandi State .	...	...	...	...	...	...	...	...	...	6	2	2	10
Kurundwad State (Senior).	...	...	...	...	...	...	1	...	...	...	...	...	1
Kurundwad State (Junior).	2	...	...	1	2	...	...	2	10	11	16	82	126
Sangli State . .	5	2	...	1	...	...	...	...	...	...	...	...	8
Bhopal Agency .	...	14	34	2	11	...	...	...	8	4	9	1	83
Bundelkhand Agency	...	...	...	...	...	...	...	...	...	16	17	21	54
Kotah State . .	...	...	...	...	...	...	...	...	...	...	...	1	1
Hyderabad State .	327	346	341	107	170	...	307	321	1,487	1,249	706	745	6,606
Mysore State . .	250	193	171	118	79	175	169	254	297	204	245	197	2,352
Cochin State . .	...	...	...	...	...	...	...	...	...	...	...	1	1

* Among the Indian States from which plague returns have been received, only those States in which at least one death from plague was reported have been included in the above table.

TABLE G.—DEATHS AND RATES *PER MILLE* FROM SMALLPOX IN RURAL AND URBAN AREAS.

	Deaths.			Death rate *per mille*.			Deaths in children.			Percentage of deaths to total mortality from smallpox.	
	Rural.	Urban.	Total.	Rural.	Urban.	Total.	Under 1 year.	1—10 years.	Total.	Under 1 year.	1—10 years.
BRITISH INDIA	36,898	11,205	48,103	0·1	0·4	0·2	9,434*	14,623*	24,057*	19·7*	30·5*
N.-W. F. P.	599	76	675	0·3	0·2	0·3	158	393	551	23·4	58·2
Punjab	3,381	930	4,311	0·1	0·3	0·2	1,177	2,131	3,308	27·3	49·4
Delhi	13	593	606	0·1	1·2	0·8	204	347	551	33·7	57·3
U. P.	7,410	2,795	10,205	0·2	0·5	0·2	2,820	3 582	6,402	27·6	35·1
Bihar	7,790	572	8,362	0·2	0·4	0·2	677	996	1,673	8·1	11·9
Orissa	3,079	203	3,282	0·4	0·9	0·5	473	779	1,252	14·4	23·7
Bengal	3,890	3,139	7,029	0·1	0·9	0·1	408	748	1,156	5·8	10·6
C. P.	490	272	762	0·0	0·1	0·0	241	348	589	31·6	45·7
Bombay	5,347	1,422	6,769	0·3	0·4	0·3	2,150	3,588	5,738	31·8	53·0
Sind	434	131	565	0·1	0·2	0·1	52	227	279	9·2	40·2
Madras	2,235	885	3,120	0·1	0·2	0·1	724	954	1,678	23·2	30·6
Coorg	1	...	1	0·0	...	0·0	1	...	1	100·0	...
Assam	2,146	51	2,197	0·3	0·2	0·3	349	530	879	15·9	24·1
Ajmer-Merwara	83	136	219	0·2	0·7	0·4	†	†	†	†	†

*Excluding Ajmer-Merwara.

†Not available.

TABLE H.—DEATHS FROM SMALLPOX BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	3,373	4,152	6,073	7,547	7,610	5,481	3,534	2,299	1,438	1,160	1,580	3,856
N.-W. F. P.	83	53	37	26	40	52	53	38	22	21	138	112
Punjab	580	566	551	475	511	427	255	112	68	42	194	530
Delhi	59	66	95	104	154	66	20	14	3	2	3	20
U. P.	725	756	1,079	1,494	2,055	1,564	707	381	153	134	179	978
Bihar	287	401	792	1,341	1,533	1,245	974	543	324	210	219	493
Orissa	271	275	384	467	457	283	208	213	199	129	121	275
Bengal	531	932	1,254	1,581	1,065	554	329	201	128	95	140	219
C. P.	18	33	148	167	126	85	38	14	8	15	25	85
Bombay	291	475	1,011	1,106	913	648	505	369	217	150	312	772
Sind	77	66	63	98	73	43	31	15	13	10	13	63
Madras	308	355	407	381	284	202	251	239	163	210	164	156
Coorg	...	1	...	...	...	...	...	...	...	...	...	...
Assam	122	156	222	269	358	283	156	159	136	142	71	123
Ajmer-Merwara	21	17	30	38	41	29	7	1	4	...	1	30

TABLE I.—DEATHS AND RATES *PER MILLE* FROM FEVERS AND MALARIA IN RURAL AND URBAN AREAS.

	Fever deaths.			Death rate *per mille*.			Reported malaria deaths.		
	Rural.	Urban.	Total.	Rural.	Urban.	Total.	Rural.	Urban.	Total.
BRITISH INDIA	3,412,844	200,532	3,613,376	13·5	7·6	13·0	1,355,325	56,289	1,411,614
N.-W. F. P.	32,336	2,228	34,564	14·6	6·4	13·5	*	30†	30
Punjab	379,266	29,410	408,676	16·1	8·3	15·1	1,606	871	2,477
Delhi	3,538	932	4,470	15·7	1·8	6·1	18	225	243
U. P.	791,440	67,051	858,491	16·6	11·1	16·0	725,699	28,469	754,168
Bihar	593,667	8,226	601,893	17·4	5·8	17·0	*	4,373†	4,373
Orissa	99,748	1,596	101,344	14·1	7·1	13·9	*	592†	592
Bengal	673,741	13,846	687,587	13·7	3 9	13·0	339,285	2,036	341,321
C. P.	279,316	21,006	300,322	18·7	11·3	17·9	262,171	14,261	276,432
Bombay	144,867	23,921	168,788	9·0	6·4	8·5	26,169	2,664	28,833
Sind	21,465	2,508	23,973	6·1	3·3	5·6	377	1,169	1,546
Madras	280,375	27,567	307,942	6·3	6·9	6·3	*	1,394†	1,394
Coorg	2,808	56	2,864	18·1	6·0	17·4	...	...	...
Assam	102,872	1,020	103,892	12·3	4·7	12·1	*	202†	20$_2$
Ajmer-Merwara	7,405	1,165	8,570	17·8	6·2	14·2	*	3	3

* Not available.

† For municipalities only.

TABLE J.—DEATHS FROM FEVERS BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	314,401	257,913	282,904	285,625	305,403	290,392	278,045	303,459	300,836	313,474	330,529	350,395
N.-W. F. P.	4,448	3,172	2,924	2,564	2,449	3,065	2,940	2,346	2,161	2,348	2,627	3,520
Punjab	36,947	31,030	30,216	27,617	38,384	39,760	35,733	33,455	31,964	32,620	34,920	36,030
Delhi	412	237	322	382	677	537	388	348	359	281	271	256
U. P.	69,036	58,405	61,415	67,010	76,824	78,763	71,461	72,142	74,825	77,417	73,682	77,511
Bihar	47,873	34,994	40,928	44,376	47,593	47,671	46,907	58,353	58,573	58,195	56,082	60,348
Orissa	9,992	8,570	9,192	8,939	7,747	6,577	6,802	9,423	8,483	7,469	8,481	9,669
Bengal	70,677	56,180	60,677	62,500	51,214	45,954	47,029	53,818	50,754	53,557	63,391	71,236
C. P.	22,588	19,060	23,760	22,474	28,320	21,176	17,858	22,378	27,054	31,435	34,040	30,179
Bombay	14,265	13,006	16,125	15,489	14,928	10,690	11,579	13,357	12,944	14,658	16,045	15,702
Sind	2,946	2,592	2,367	2,056	2,064	1,671	1,568	1,384	1,307	1,713	2,075	2,230
Madras	25,081	22,570	26,654	22,547	24,570	24,106	24,372	25,832	23,915	24,922	29,667	33,706
Coorg	221	217	241	282	228	283	328	242	260	172	186	204
Assam	9,044	7,034	7,256	8,596	8,941	9,583	10,539	9,916	7,657	8,043	8,403	8,880
Ajmer-Merwara	871	846	827	793	864	556	541	465	580	644	659	924

TABLE K.—DEATHS AND RATES *PER MILLE* FROM DYSENTERY AND DIARRHŒA IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate *per mille*		
	Rural.	Urban.	Total.	Male.	Female.	Rural.	Urban.	Total.
BRITISH INDIA	201,662	58,638	260,300	136,113	124,187	0·8	2·2	0·9
N.-W. F. P.	120	192	312	183	129	0·1	0·6	0·1
Punjab	6,141	4,348	10,489	5,746	4,743	0·3	1·2	0·4
Delhi	198	883	1,081	545	536	0·9	1·7	1·5
U. P.	5,280	12,692	17,962	9,266	8,696	0·1	2·1	0·3
Bihar	3,330	811	4,141	2,462	1,679	0·1	0·6	0·1
Orissa	16,746	657	17,403	8,972	8,431	2·4	2·9	2·4
Bengal	46,985	7,468	54,453	28,703	25,750	1·0	2·1	1·0
C. P.	25,796	4,639	30,435	15,718	14,717	1·7	2·5	1·8
Bombay	19,028	6,539	25,567	13,366	12,201	1·2	1·7	1·3
Sind	177	973	1,150	639	511	0·1	1·3	0·3
Madras	66,621	18,285	84,906	43,858	41,048	1·5	4·6	1·8
Coorg	75	28	103	57	46	0·5	3·0	0·6
Assam	11,156	485	11,641	6,264	5,377	1·3	2·2	1·4
Ajmer-Merwara	9	648	657	334	323	0·0	3·5	1·1

TABLE L.—DEATHS FROM DYSENTERY AND DIARRHŒA BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	21,189	16,907	19,508	19,428	20,589	19,197	23,077	28,920	24,594	22,096	22,329	22,466
N.-W. F. P.	18	15	17	14	47	39	34	25	22	24	35	22
Punjab	537	442	604	703	1,252	1,126	1,047	1,146	1,029	839	963	801
Delhi	44	25	60	80	130	126	125	143	116	100	80	52
U. P.	871	771	964	1,251	1,526	1,502	2,208	2,643	2,000	1,663	1,343	1,220
Bihar	201	160	252	430	272	230	439	688	453	463	315	238
Orissa	1,708	1,299	1,459	1,220	1,232	1,176	1,427	2,139	1,872	1,356	1,210	1,305
Bengal	5,825	4,184	5,262	5,418	4,102	3,791	3,981	4,411	3,819	4,282	4,889	4,539
C. P.	2,326	1,872	2,277	1,953	1,806	1,830	2,065	3,727	4,271	3,758	2,966	2,084
Bombay	1,838	1,458	1,673	1,651	1,848	1,578	2,704	3,790	2,953	2,363	1,880	1,831
Sind	72	61	71	79	99	98	97	126	102	110	111	124
Madras	6,417	5,826	5,894	5,401	7,046	7,038	7,847	9,064	7,126	6,208	7,614	9,425
Coorg	6	4	10	7	12	14	23	10	7	2	4	4
Assam	1,278	772	922	1,164	1,119	1,106	1,028	962	748	850	919	773
Ajmer-Merwara	48	18	43	57	98	43	52	46	76	78	50	48

TABLE M.— DEATHS AND RATES PER MILLE FROM RESPIRATORY DISEASES IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate per mille.					Reported deaths from pulmonary tuberculosis.	
	Rural	Urban	Total.	Male	Female	Rural	Urban	Total.	Male	Female	Rural	Urban
BRITISH INDIA	344,309	155,030	499,339	284,376	214,963	1·4	5·9	1·8	2·0	1·6	35,339	30,247
N.-W. F. P.	2,002	1,241	3,243	1,883	1,360	0·9	3·6	1·3	1·4	1·2	*	289†
Punjab	63,466	16,309	79,775	45,222	34,553	2·7	4·6	2·9	3·1	2·8	9,821	2,698
Delhi	963	4,092	5,055	2,578	2,477	4·3	8·1	6·9	6·1	7·9	167	841
U. P.	8,637	32,761	41,398	22,151	19,247	0·2	5·4	0·8	0·8	0·8	608	5,035
Bihar	2,471	642	3,113	1,870	1,243	0·1	0·5	0.1	0·1	0·1	*	159†
Orissa	4,304	392	4,696	2,737	1,959	0·6	1·7	0·6	0·8	0·5	*	109†
Bengal	71,160	17,298	88,458	56,499	31,959	1·4	4·9	1·7	2·1	1·3	8,164	4,258
C. P.	35,320	8,811	44,131	25,819	18,312	2·4	4·8	2·6	3·1	2·2	652	511
Bombay	74,510	35,412	109,922	59,490	50,432	4·6	9·4	5·5	5·8	5·3	15,446	7,749
Sind	4,117	4,327	8,444	5,102	3,342	1·2	5·6	2·0	2·1	1·8	481	978
Madras	71,785	30,345	102,130	55,860	46,270	1·6	7·6	2·1	2.3	1·9	*	6,965†
Coorg	73	97	170	128	42	0·5	10·3	1·0	1·4	0·6	...	...
Assam	5,488	493	5,981	3,622	2,359	0·7	2·3	0·7	0·8	0·6	*	48†
Ajmer-Merwara	13	2,810	2,823	1,415	1,408	0·0	15·0	4·7	4·4	5·0	*	607†

*Not available. † For municipalities only.

TABLE N.—DEATHS FROM RESPIRATORY DISEASES BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	54,625	47,727	49,327	42,068	39,886	33,645	33,719	34,815	34,291	36,579	43,486	49,171
N.-W. F. P.	587	420	368	207	216	252	190	168	142	142	214	337
Punjab	12,819	10,605	9,402	6,518	6,102	4,804	4,252	3,995	3,773	4,026	5,617	7,863
Delhi	650	529	467	407	576	342	315	343	239	301	388	498
U. P.	4,600	3,730	3,666	3,492	3,406	3,228	3,076	3,041	2,977	2,942	3,311	3,929
Bihar	308	190	309	236	214	211	291	267	249	257	249	322
Orissa	462	412	414	385	355	304	369	392	386	359	422	436
Bengal	9,341	8,630	8,765	8,350	6,765	5,724	5,570	5,703	5,673	6,295	8,405	9,147
C. P.	4,210	3,722	4,200	3,528	3,671	2,713	2,840	3,131	3,635	3,757	4,407	4,317
Bombay	10,592	9,660	11,374	9,785	8,814	6,882	7,672	8,404	8,220	8,959	9,150	10,410
Sind	1,311	1,244	1,069	689	466	442	409	374	331	433	685	941
Madras	8,833	7,827	8,540	7,642	8,382	8,072	8,108	8,311	8,069	8,383	9,806	10,157
Coorg	20	22	23	16	11	16	7	11	11	15	12	6
Assam	557	513	509	571	504	536	457	518	358	482	512	464
Ajmer-Merwara	335	228	221	242	404	119	163	157	178	19	218	344

TABLE O.—DISTRIBUTION OF QUININE, CINCHONA FEBRIFUGE, TOTAQUINA AND OTHER CINCHONA ALKALOIDS DURING 1939.

Province	Rural Areas: Distributed free: Quinine	Cinchona febrifuge	Totaquina	Other Cinchona alkaloids.	Rural Areas: Sold: Quinine	Cinchona febrifuge	Totaquina	Other Cinchona alkaloids	Rural Areas: Total: Quinine	Cinchona febrifuge	Totaquina	Other Cinchona alkaloids	Total columns 10-13
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
BRITISH INDIA	**32,213**	**26,305**	**2,121**	**399**	**32,722**	**678**	**250**	**7**	**64,935**	**26,983**	**2,371**	**406**	**94,695**
N. W. F. P.	478	317	6	...	...	...	...	...	478	317	6	...	801
Punjab	1,393	268	*	7	...	...	...	...	1,393	268	*	7	1,668
Delhi	48	11	...	...	...	...	...	...	48	11	...	...	59
U. P.	2,248	3,789	11	...	246	6	1	...	2,494	3,795	12	...	6,301
Bihar	2,406	...	...	...	†	...	...	...	2,406	...	...	...	2,406
Orissa	529	434	80	58	135	...	...	...	664	434	80	58	1,236
Bengal	15,949	17,613	118	88	27,910	38	...	1	43,859	17,651	118	89	61,717
C. P.	1,167	498	9	17	1,759	39	5	...	2,926	537	14	17	3,494
Bombay†	...	...	...	...	...	...	...	...	...	...	...	...	...
Sind	1,837	199	30	63	727	1	...	...	2,564	200	30	63	2,857
Madras	3,384	471	1,593	138	1,743	22	244	6	5,127	493	1,837	144	7,601
Coorg	540	521	120	5	12	...	...	...	552	521	120	5	1,198
Assam	2,215	2,182	154	23	190	572	...	...	2,405	2,754	154	23	5,363
Ajmer-Merwara	19	2	...	...	...	...	...	...	19	2	...	...	21
					Urban Area								
BRITISH INDIA	**8,756**	**4,017**	**1,115**	**230**	**7,315**	**416**	**2,766**	**505**	**16,071**	**4,433**	**3,881**	**735**	**25,120**
N. W. F. P.	352	221	9	...	...	...	...	...	352	221	9	...	582
Punjab	2,288	182	*	27	...	...	...	...	2,288	182	*	27	2,497
Delhi	132	53	...	...	...	...	...	...	132	53	...	...	185
U. P.	1,429	1,125	24	...	...	...	...	...	1,429	1,125	24	...	2,578
Bihar	...	...	...	...	†	...	...	...	...	...	...	...	...
Orissa	325	184	15	7	62	...	16	1	387	184	31	8	610
Bengal	1,203	825	6	24	3,507	...	...	...	4,710	825	6	24	5,565
C. P.	857	649	14	27	979	46	...	...	1,836	695	14	27	2,572
Bombay†	...	...	...	...	...	...	...	...	...	...	...	...	...
Sind	372	161	21	55	40	1	5	1	412	162	26	56	656
Madras	1,012	61	945	69	2,680	256	2,745	503	3,692	317	3,690	572	8,271
Coorg	111	101	51	...	9	...	...	...	120	101	51	...	272
Assam	605	397	30	21	38	113	...	...	643	510	30	21	1,204
Ajmer-Merwara	70	59	...	...	...	...	...	...	70	58	...	...	128

*Less than half pound.
†Details according to rural and urban areas are not available. See total on the next page.

TOTAL

1	2	3	4	5	6	7	8	9	10	11	12	13	14
BRITISH INDIA	45.322	30,947	3,419	893	43,515	1.096	3,016	513	88,837	32,042	6,435	1,405	128,719
N. W. F. P.	1,237†	692‡	18**	...	...	...	...	...	1,237	692	18	...	1,947
Punjab	3,681	450	*	34	...	...	...	...	3,681	450	*	34	4,165
Delhi	180	64	...	...	...	...	...	...	180	64	...	...	244
U. P.	3,677	4,914	35	...	246	6	1	...	3,923	4,920	36	...	8,879
Bihar	2,406	...	...	...	378	...	...	...	2,784	...	...	...	2,784
Orissa	854	618	95	66	197	...	16	1	1,051	618	111	66	1,846
Bengal	17,152	18,438	124	112	31,417	38	...	1	48,569	18,476	124	113	67,282
C. P.	2,024	1,147	23	44	2,738	85	5	...	4,762	1,232	28	44	6,066
Bombay	3,946	471	180	264	3,100	1	*	...	7,046	472	180	264	7,962
Sind	2,209	360	51	118	767	2	5	1	2,976	362	56	119	3,513
Madras	4,396	532	2,538	207	4,423	278	2,989	509	8,819	810	5,527	716	15,872
Coorg	651	622	171	5	21	...	...	...	672	622	171	5	1,470
Assam	2,820	2,579	184	44	228	685	...	...	3,048	3,264	184	44	6,540
Ajmer-Merwara	89	60	...	...	...	...	...	...	89	60	...	...	149

*Less than half pound.
†Including 407 lbs. distributed free in tribal areas.
‡Including 154 lbs. distributed free in tribal areas.
**Including 3 lbs. distributed free in tribal areas.

Appendix III.

TABLE A.—MATERNAL DEATH RATES PER 1,000 OF LIVE AND STILL-BIRTHS FOR CERTAIN TOWNS IN BRITISH INDIA.

	1939. Deaths.	1939. Rate. p. mille
North-West Frontier Province.		
Peshawar	19	6·1
Dera Ismail Khan	5	3·0
Punjab.		
Bhiwani	10	5·9
Rohtak	2	1·3
Panipat	16	10·8
Ambala City	6	4·4
Jullundur	14	3·3
Ludhiana	30	8·3
Ferozepore	5	2·9
Lahore	82	4·9
Kasur	7	3·7
Amritsar	63	5·9
Batala	1	0·5
Sialkot	7	1·6
Gujranwala	0	0·0
Rawalpindi	2	0·5
Lyallpur	20	8·0
Jhang Maghiana	13	6·8
Multan	63	11·4
Delhi Province.		
Delhi City	82	4·7
New Delhi	10	3·1
United Provinces.		
Lucknow	102	7·3
Cawnpore	113	8·9
Agra	72	5·3
Benares	169	13·6
Allahabad	76	9·2
Bareilly	26	4·0
Moradabad	59	9·3
Meerut	39	9·3
Koil (Aligarh)	43	11·4
Shahjahanpur	8	2·7
Saharanpur	30	7·4
Jhansi	30	7·9
Mirzapur-Bindhachal	17	6·1
Muttra	15	4·3
Fyzabad-Ajodhya	19	12·1
Gorakhpur	27	10·6
Farrukhabad-*cum*-Fatehgarh	7	2·6
United Provinces—contd.		
Etawah	35	12·9
Budaun	11	5·4
Amroha	31	11·4
Sambhal	20	7·6
Dehra Dun	28	13·0
Hathras	19	7·8
Jaunpur	17	11·1
Pilibhit	15	7·5
Muzaffarnagar	10	6·7
Bahraich	8	4·8
Hardwar Union	37	25·8
Khurja	6	3·7
Bihar.		
Patna	0	0·0
Bihar	0	0·0
Gaya	0	0.0
Arrah	0	0·0
Chapra	0	0·0
Muzaffarpur	18	26·1
Darbhanga	15	7·3
Monghyr	11	9·1
Jamalpur	8	7·5
Bhagalpur	0	0·0
Ranchi	0	0·0
Jamshedpur	0	0·0
Orissa.		
Berhampur	15	9·0
Cuttack	12	10·3
Puri	3	2·7
Bengal Presidency.		
Calcutta	80	2·5
Howrah	68	9·7
Dacca	65	11·0
Bhatpara	28	12·4
Garden Reach	10	9·4
Chittagong	30	17·4
Titagarh	6	7·6
Burdwan	17	14·4
South Suburban	1	1·1
Serampur	2	2·3
Baranagar	11	11·8
Barisal	10	13·1

TABLE A.—MATERNAL DEATH RATES PER 1,000 OF LIVE AND STILL-BIRTHS FOR CERTAIN TOWNS IN BRITISH INDIA—*contd.*

	1939. Deaths.	1939. Rate. *p. mille*
***Bengal Presidency*—contd.**		
Narayanganj	14	10·8
Hooghly-Chinsura	12	10·2
Sirajganj	9	15·5
Midnapur	14	18·9
Bankura	12	29·7
Comilla	10	29·5
Asansol	16	16·3
Naihati	5	16·4
Mymensingh	6	15·3
Kamarhati	9	16·2
Bally	3	5·2
Central Provinces.		
Nagpur City and Nagpur Civil Station	135	11·7
Jubbulpore	66	10·3
Saugor	18	7·9
Khandwa	14	8·8
Burhanpur	36	15·4
Raipur	21	10·3
Amraoti	62	23·4
Akola	2	0·8
Bombay Presidency.		
Bombay City	165	4·1
Ahmedabad	163	7·5
Surat	44	6·5
Broach	33	14·4
Nadiad	19	10·2
Godhra	0	0.0
Jalgaon	32	19·5
Dhulia	1	0·7
Ahmednagar	23	9·0
Poona	83	10·5
Nasik	6	3·3
Bandra	0	0·0
Kurla	0	0·0
Belgaum	27	19·1
Dharwar	6	4·3
Hubli	24	8·9
Gadag-Betigeri	12	6·0
Bijapur	12	7·3
Sholapur	43	5·4
Sind.		
Karachi	93	6·2
Hyderabad	52	12·3
Sukkur	14	5·4
Shikarpur	58	25·0
Madras Presidency.		
Bellary	44	18·7
Adoni	15	9·5
Conjeeveram	57	19·0
Saidapet	3	2·5
Coimbatore	50	10·2
Erode	23	15·1
Cocanada	24	11·5
Rajahmundry	38	15·4
Ellore	26	10·9
Guntur	77	19·9
Tenali	24	16·3
Bezwada	47	17·5
Masulipatam	38	16·0
Kurnool	24	12·8
Madras	245	7·4
Madura	114	10·5
Dindigul	29	13·0
Calicut	28	7·4
Palghat	19	8·8
Cannanore	12	12·8
Tellicherry		7·8
Nellore	61	20·4
Vellore	37	10·7
Virudhunagar	20	12·8
Srivilliputtur	17	12·5
Salem	48	11·5
Cuddalore	42	16·8
Mangalore	30	12·1
Tanjore	47	15·5
Kumbakonam	59	20·3
Negapatam	17	10·1
Mayavaram	19	15·9
Tuticorin	31	10·3
Tinnevelly	34	15·5
Trichinopoly	94	15·9
Vizagapatam	10	4·3
Vizianagram	23	11·4
Ajmer-Merwara.		
Ajmer	53	8·3

Table B.—Maternity and Child Welfare Centres in Rural and Urban areas.

	Centres maintained by								Trained visitors.		Trained midwives.		Trained *dais*.	
	Government.		Local and municipal bodies.		Other agencies.		Total.							
	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.
British India	10	14	367	367	68	195	445	576	75	277	1,459	1,367	2,572	2,767
N.-W. F. P.	..	2	..	..	1	6	1	8	..	6	..	5	34	7
Punjab	1	1	20	24	11	41	32	66	32	70	6	31	655	1,270
Delhi	4	..	4	21	2	2	10	23	8	29	10	23	12	48
U. P.	..	..	160	157	..	..	160	157	1	20	154	193	64	50
Bihar	..	6	..	7	3	8	3	21	..	11	34	46	26	49
Orissa	..	..	2	4	1	2	3	6	..	3	14	9	10	9
Bengal	..	..	4	29	4	..	8	29	6	7	26	75	1,613	755
C. P.	..	..	..	7	16	51	16	58	17	63	1	..	37	453
Bombay	1	2	25	19	15	41	41	62	2	15	41	173	54	37
Sind	..	..	30	9	5	14	35	23	..	5	7	32	48	43
Madras	4	..	122	84	10	16	136	100	9	44	1,160	738	..	..
Coorg	..	..	..	..	..	..	..	..	..	..	..	..	11	..
Assam	..	3	..	4	..	6	..	13	..	4	6	23	8	7
Ajmer-Merwara	..	..	..	2	..	8	..	10	..	..	..	19	..	39

R.—Rural. U.—Urban.

Appendix IV.

TABLE A.—EXPENDITURE ON PUBLIC HEALTH BY CENTRAL AND PROVINCIAL GOVERNMENTS DURING 1939-40.

	Total.	Public Health establishment.	Grants for public health purposes.	Expenses in connection with epidemic diseases.	Bacteriological laboratories.	Pasteur Institutes.	Works.	Special Development programme.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Total	1,80,17,859	66,24,505	56,09,790	25,00,737	11,65,567	2,10,581	12,65,737	6,40,942
Central Govt. . . .	12,61,147	4,73,556	3,01,839	2,39,966	2,34,441	6,306	5,039	..
N.-W. F. P. . . .	1,53,948	1,09,953	30,545	13,450	..	..	..	..
Punjab	17,73,971	8,03,637	6,77,832	1,03,970	19,511	17,801	20,003	1,31,217
U. P.	23,44,409	15,60,634	4,29,023	2,96,719	..	..	58,033	..
Bihar	12,02,832	3,98,776	3,19,449	2,58,148	30,205	16,453	1,79,801	..
Orissa	2,60,032	99,123	64,946	46,414	15,878	2,427	31,244	..
Bengal	39,23,256	6,78,066	25,19,409	5,77,761	81,775	39,958	26,287	..
C. P.	5,05,868	94,972	74,697	3,33,470	2,729	..	..	..
Bombay	27,86,516	6,73,266	1,30,087	2,10,366	3,32,210	9,752	9,21,110	5,09,725
Sind	2,65,708	1,13,004	85,828	41,353	21,584	3,939	..	..
Madras	27,07,039	12,62,623	8,72,434	1,56,481	4,15,237	..	264	..
Coorg	21,425	10,328	2,458	8,639	..	..	..	..
Assam	8,11,708	3,46,567	1,01,243	2,14,000	11,997	1,13,945	23,956	..

TABLE B.—DISTRIBUTION OF HEALTH STAFFS IN RURAL AND URBAN AREAS.

Rural Areas.

	Medical Officers of Health.				Epidemic Staffs.	Sanitary and Health Inspectors.	Vaccinators.		School Medical Officers.	Other Health Staffs.
	Medical graduates holding public health qualifications.		Medical Licentiates holding public health qualifications.				M.	F.		
	Whole time.	Part time.	Whole time.	Part time.						
Total	151	2	84	...	642	1,403	6,531	85	26	1,589
N.-W. F. P.	...	...	...	...	4*	...	30	...	7	4*
Punjab	28	...	11	...	...	46	422	...	4	629
Delhi	1	1	...	...	...	8	3	...	5	24
U. P.	46	1	32	...	43	162	821	...	...	...
Bihar	10	...	10	...	227	90	1,079	...	8	134
Orissa	4	...	1	...	29	66	205	7	2	16
Bengal	30	...	8	...	124	658	2,266	59	..	688
C. P.	...	...	...	...	82	...	259	...	...	35
Bombay	2	...	...	...	47	25	303	...	...	59
Sind	...	...	1	...	...	1	75	1	...	...
Madras	27	...	20	...	23	345	619	17	...	...
Coorg	1	...	1	...	...	2	4	...	...	...
Assam	2	...	...	...	63	...	435	1	...	...
Ajmer-Merwara	...	...	...	...	...	...	10	...	...	...

* Appointments sanctioned for rural as well as for urban areas.

Urban Areas.

	Medical Officers of Health.				Sanitary and Health Inspectors.	Vaccinators.		Inspectors of Vaccination.	School Medical Officers.	Other Health Staffs.
	Medical Graduates holding public health qualifications.		Medical licentiates holding public health qualifications.			M.	F.			
	Whole time.	Part time.	Whole time.	Part time.						
Total	151	8	114	8	1,154	977	50	85	89	12,966
N.-W. F. P.	1	...	3	2	10	8	1	6	6	...
Punjab	16	7	4	6	176	143	6	7	33	12,881
Delhi	3	...	...	...	24	17	...	...	12	19
U. P.	21	...	13	...	176	177	...	...	13	..
Bihar	10	1	2	...	100	75	...	...	...	13
Orissa	2	...	2	...	13	16	4	2	...	22
Bengal	29	...	...	...	106	151	19	9	10	157
C. P.	2	...	2	...	59	88	...	*	‡	3
Bombay	34	...	49	...	121	56	...	1	8	254
Sind	6	...	3	...	25	12	2	1	1	...
Madras	24	...	36	...	316	191	18	17	6	...
Coorg	...	...	...	...	2	2	...	...	...	...
Assam	1	...	...	...	14	29	...	41	..	98
Ajmer-Merwara	2	...	...	...	12	12	...	1†	...	19

*Thirty-five assistant superintendents of vaccination shown under the column heading "Other health staff" for rural areas are for the urban areas also.

†For both rural and urban areas.

‡ There are no officers appointed particularly for the medical inspection of schools. The work is done by the Sub-assistant Health Officers on epidemic duty and Assistant Medical Officers incharge of branch dispensaries.

Appendix V.

TABLE A—VACCINATION OPERATIONS PERFORMED IN BRITISH INDIA AND IN DIFFERENT PROVINCES DURING 1939-40.

Provinces.	Operations performed.			Percentage of success.		Children successfully vaccinated.		Successfully vaccinated children under one year of age as a percentage of live-births during the year 1939.
	P.	R.	Total.	P.	R.	Under 1 year.	1 to 6 years.	
BRITISH INDIA	10,399,676	15,301,134	25,700,810	97	46	4,333,410	4,093,823	46
N.-W. F.P.	161,873	152,482	314,355	99	80	78,641	58,196	110
Punjab	1,072,841	3,430,138	4,502,979	99	63	809,001	145,003	73
Delhi	34,862	206,867	241,729	97	52	25,505	5,283	80
U P.	1,635,158	471,111	2,106,269	97	36	991,678	441,890	56
Bihar	1,017,374	820,087	1,837,461	98	34	280,046	634,768	26
Orissa	231,214	475,061	706,275	97	60	68,837	118,527	28
Bengal	2,909,956	5,017,380	7,927,336	85	31	388,954	1,527,539	24
C. P.	495,950	284,796	780,746	97	56	364,718	86,560	57
Bombay	667,049	510,152	1,177,201	100	45	467,169	151,464	60
Sind	142,228	80,937	224,165	100	27	68,188	56,900	84
Madras	1,516,894	3,320,875	4,837,769	97	21	682,500	574,866	40
Coorg	2,809	3,420	6,229	97	55	540	1,587	14
Assam	471,571	474,305	945,876	95	59	87,889	281,175	36
Ajmer-Merwara	38,897	53,523	92,420	99	98	19,799	10,065	96

P = Primary.
R = Revaccinations.

TABLE B.—NUMBERS OF TOWNS AND RURAL CIRCLES IN THE DIFFERENT PROVINCES IN WHICH COMPULSORY PRIMARY VACCINATION WAS IN FORCE DURING 1939.

	Towns.			Rural Circles.		
	Total number.	Number in which vaccination Act was in force.	Number to which the Act had not been extended.	Total number.	Number in which vaccination Act was in force.	Number to which the Act had not been extended.
BRITISH INDIA	1,594	1,286	308	3,531	2,219	1,312
N.-W. F. P.	17	10	7	6	...	6
Punjab	259	250	9	29	*28	1
Delhi	6	6	...	1	1	...
U. P.	442	262	180	748	...	748
Bihar	54	54	...	1,540	1,518	22
Orissa	8	8	...	8	2	6
Bengal	119	119	...	575	575	...
C. P.	114	95	19	392	59	333
Bombay	183	96	87	20	†1	19
Sind	26	26	...	61	...	61
Madras	324	324	...	24	24	...
Coorg	5	5	...	...	...	...
Assam	32	26	6	117	11	106
Ajmer-Merwara	5	5	...	10	...	10

* This figure includes five districts in which the Vaccination Act was enforced only in a part of the district in each case.

† Only 10 villages in Belgaum district.

TABLE C.—AREAS IN THE PROVINCES IN WHICH REVACCINATION WAS COMPULSORY IN 1939.

	Towns.			Rural circles.		
	Total number.	Number in which revaccination was in force.	Number in which it was not in force.	Total number.	Number in which revaccination was in force.	Number in which it was not in force.
Orissa	8	...	8	8	1	7
Madras	324	324	...	24	24	...
Assam	32	26	6	117	11	106
Ajmer-Merwara	5	4	1	10	...	10
Delhi	Revaccination was compulsory for school children when seeking admission in the recognised schools of Delhi province.					
Bengal	Revaccination was made compulsory only in the epidemic areas in the province where regulations for the control of smallpox under the Epidemic Diseases Act were enforced as a temporary measure during the year.					
C. P.	Information for revaccination is not available.					
N.-W. F. P., Punjab, U. P., Bihar, Bombay, Sind, Coorg	Revaccination was not compulsory in any area, urban or rural, in these provinces.					

TABLE D.—VACCINATION STATISTICS RELATING TO SOME INDIAN STATES DURING 1939-40.

State.	Population (1931 census).	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Revaccination.	Total.	Primary.	Revaccination.	Under 1 year.	1—6 years.
Hyderabad . . .	14,436,148	415,469	12,207	427,676	96	55	99,442	198,799
Mysore	6,895,667	195,915	165,503	361,418	96	51	62,005	91,515
RAJPUTANA STATES.								
Jaipur	2,631,775	86,436	3,817	90,253	94	62	66,350	5,349
Marwar . . .	2,134,848	73,804	138,827	212,631	96	45	44,996	7,135
Mewar . . .	1,611,373	39,986	2,359	42,345	100	100	25,213	13,022
Bikaner . . .	936,218	23,576	35,869	59,445	99	53	15,674	6,255
Alwar	749,751	23,207	730	23,937	76	74	15,437	1,736
Kotah	685,804	25,586	..	25,586	100	..	22,686	2,812
Bharatpur . . .	486,954	16,694	505	17,199	94	48	10,911	3,224
Dholpur . . .	254,986	9,133	..	9,133	100	..	6,951	2,122
Dungarpur . . .	227,544	3,406	..	3,406	94	..	871	1,971
Banswara . . .	225,106	3,840	..	3,840	100	..	1,406	2,234
Bundi	216,722	5,913	..	5,913	100	..	3,864	1,799
Sirohi	216,528	4,969	12	4,981	100	100	4,672	297
Palanpur . . .	264,179	6,893	359	7,252	100	100	5,486	635
PUNJAB STATES.								
Nabha	287,574	11,628	3,918	15,546	94	69	3,553	5,720
Bahawalpur . . .	984,612	45,407	12,932	58,339	96	90	22,609	13,693
Patiala	1,625,520	67,439	77,121	144,560	98	72	46,145	11,008

TABLE D.—*contd.*

State.	Population (1931 census).	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Revaccination.	Total.	Primary.	Revaccination.	Under 1 year.	1—6 years.
PUNJAB STATES—*contd.*								
Kapurthala	316,757	12,974	19,081	32,055	96	38	7,982	2,784
Jind	324,676	13,002	9,534	22,536	95	70	6,113	3,439
Faridkot	164,364	6,736	4,886	11,622	99	43	3,816	2,513
Baghal	26,352	744	1,731	2,475	99	61	373	261
Balsan	6,864	336	13	349	100	54	1	207
Bilaspur	100,994	4,350	4,358	8,708	99	54	2,522	1,528
Koti Kiar	8,785	224	30	254	100	54	70	102
Throach	4,568	263	8	371	100	67	58	104
Darkoti	531	22	14	36	100	57	1	16
Delath	1,400	63	1	64	100	100	61	1
Dhadi	212	10	..	10	100	..	1	9
Dhami	5,232	113	39	152	99	54	39	66
Ghund	1,963	84	7	91	100	67	..	55
Khaneti	2,797	93	..	..	100	..	34	49
Kumhar Sain	12,781	240	17	257	100	77	53	145
Kuthar	3,760	131	150	281	100	56	80	38
Madhan	4,315	119	..	119	100	..	..	46
Mangal	1,248	46	43	89	100	62	17	25
Mehlog	8,155	386	2,251	2,637	100	66	200	110
Ratesh	558	12	13	25	100	78	2	7
Rawingarh	939	44	8	52	100	50	7	30
Sangri	3,497	90	24	114	100	53	48	37
Theog	6,912	106	5	111	99	100	8	84
Kalsia	59,848	1,561	4,857	6,418	100	75	1,201	199

TABLE D.—*contd.*

State.	Population (1931 census).	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Revaccination.	Total.	Primary.	Revaccination.	Under 1 year.	1—6 years.
PUNJAB STATES—*concld.*								
Sirmoor	148,568	1,647	2,472	4,119	99	77	1,073	383
Suket	58,408	817	6,698	7,515	100	67	460	271
U. P. STATES.								
Tehri (Garhwal)	470,109	9,660	1,992	11,652	77	97	4,049	3,807
Benares	391,165	7,919	3,653	11,572	98	100	2,115	4,598
Rampur	465,225	25,754	12,078	37,832	94	52	13,000	5,672
CENTRAL INDIA AGENCY.								
Indore	1,325,089	50,357	26,010	76,367	78	17	29,079	8,778
Rewa	1,596,971	62,293	371	62,664	99	51	39,059	21,979
Orchha	314,661	8,517	1,461	9,978	95	91	5,940	995
Datia	158,834	5,139	380	5,519	97	100	4,696	239
Samthar	33,307	1,333	4	1,337	99	100	1,000	292
Panna	212,130	6,104	49	6,153	95	100	4,421	477
Charkhari	120,351	4,809		4,809	96	..	2,689	1,838
Ajaigarh	85,895	1,957	60	2,017	90	79	1,257	257
Bijawar	115,852	6,028	..	6,028	85	..	5,126	..
Baoni	19,132	322	..	322	100	..	261	54
Chhatarpur	163,652	5,193	..	5,193	99	..	4,076	517
Baraundha	16,071	*	*	*	*	*	*	*
Nagod	74,589	2,712	58	2,770	96	..	1,772	374
Maihar	68,991	1,930	72	2,002	94	67	1,055	653
Bhopal	729,955	29,339	119	29,458	80	92	13,161	10,369
Dewas Senior Branch	83,321	2,071	8	2,079	..	..	1,047	547

*Information not available.

TABLE D.—*contd.*

State.	Population (1931 census).	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Revaccination.	Total.	Primary.	Revaccination.	Under 1 year.	1—6 years.
CENTRAL INDIA AGENCY—*contd.*								
Dewas Junior	70,513	2,656	41	2,697	96	83	1,041	1,485
Rajgarh	135,271	3,315	3,736	7,051	100	100	2,020	1,254
Narsingarh	113,873	12,942	1,252	14,194	99	100	2,417	1,897
Khilchipur	45,583	1,358	11	1,369	99	100	630	728
Dhar	187,304	1,860	566	2,426	78	24	1,612	814
Jaora	100,166	2,850	*Nil*	2,850	100	*Nil*	2,080	770
Ratlam	107,321	1,928	86	2,014	96	84	962	718
Sitamau	28,422	504	332	836	65	4	419	85
Sailana	35,223	850	*Nil*	850	67	*Nil*	403	447
Jhabua	145,522	5,528	78	5,606	87	..	1,269	2,129
Barwani	141,110	7,880	*Nil*	7,880	95	*Nil*	3,756	3,757
Alirajpur	101,963	2,960	19	2,979	81	11	185	2,018
Jammu and Kashmir	3,646,243	106,243	60,177	166,420	99	89	63,625	34,474
KOLHAPUR AND DECCAN STATES.								
Kolhapur	957,137	35,753	62,277	98,030	100	99	30,961	3,770
Akalkot	92,605	3,127	59	3,186	100	100	2,341	845
Aundh	76,507	2,657	938	3,595	100	13	1,442	897
Bhor	141,546	4,179	2,119	6,298	99	33	2,929	1,119
Kurundwad (Senior)	44,204	1,639	391	2,030	97	51	1,216	323
Kurundwad (Junior)	39,583	1,575	305	1,880	100	27	1,207	349

TABLE D.—*contd.*

State.	Population (1931 census).	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Revaccination.	Total.	Primary.	Revaccination.	Under 1 year.	1—6 years.
KOLHAPUR AND DECCAN STATES—*contd.*								
Janjira	98,296	2,843	450	3,293	99	58	1,407	1,364
Jamkhandi	114,282	4,024	2,663	6,687	97	68	2,930	901
Jath	91,099	2,816	2,505	5,321	98	9	1,924	850
Miraj (Junior)	40,686	1,356	955	2,311	100	65	1,150	206
Miraj (Senior)	93,938	3,585	973	4,558	100	100	2,527	1,014
Mudhol	62,832	2,088	454	2,542	97	19	1,582	437
Ramdurg	35,401	1,185	141	1,326	34	58	884	300
Phaltan	58,731	1,802	3,978	5,780	89	81	1,366	283
Sangli	258,442	10,079	14,233	24,312	99	16	7,300	2,411
Savanur	20,320	838	518	1,356	97	97	700	100
Sawantwadi	230,589	6,682	3,052	9,734	100	90	4,746	1,882
Khatav	1,331	120	..	120	100	..	35	85
Bavchi	373	30	..	30	100	..	6	24
EASTERN STATES.								
Bastar	524,721	21,147	16,537	37,684	96	56	4,894	11,510
Jashpur	193,698	5,703	17,004	22,707	86	33	3,451	2,190
Kalahandi	513,716	25,429	20,857	46,286	97	95	1,703	20,343
Kanker	136,101	4,851	2,368	7,219	99	94	3,695	868
Khairagarh	157,400	4,564	10,198	14,762	95	42	3,717	1,562
Korea	90,886	2,028	717	2,745	87	53	1,382	385

TABLE D.—*concld.*

State.	Population (1931 census).	Total number of vaccinations performed.			Percentage of successful vaccinations to total vaccinations performed.		Children successfully vaccinated.	
		Primary.	Revaccinations.	Total.	Primary.	Revaccinations.	Under 1 year.	1—6 years.
EASTERN STATES—*contd.*								
Nandgaon	182,380	7,025	6,989	14,014	99	70	5,991	742
Patna	566,924	22,281	59,464	81,745	99	97	882	21,216
Raigarh	277,569	8,658	1,412	10,070	76	43	4,556	2,652
Sarangarh	128,967	3,539	2,745	6,284	97	5	1,618	231
Surguja	501,939	10,630	12,110	22,740	81	70	3,630	4,653
Cooch Behar	590,866	15,308	44,361	59,669	85	80	1,271	*
Mayurbhanj	889,603	34,433	32,023	66,456	97	96	7,336	15,398
Bamra	151,047	4,313	31,302	35,615	100	82	1,151	3,113
Baudh	135,248	5,077	12,836	17,913	87	64	329	4,048
Dhenkanal	284,326	10,174	22,831	33,005	84	55	3,314	8,695
Gangpur	356,674	11,629	25,485	37,114	87	85	4,807	13,016
Nayagarh	142,406	7,650	16,505	24,155	80	72	*	*
Keonjhar	460,609	22,544	26,320	48,864	91	83	306	18,260
Seraikela	143,525	7,667	3,577	11,244	100	70	3,182	3,756
Sonepur	237,920	6,051	19,304	25,355	99	59	3,352	2,684
Talcher	69,702	2,449	2,489	4,938	91	43	57	1,550
Tripura	382,450	10,715	5,404	16,119	87	67	2,256	5,865
MADRAS STATES.								
Travancore	5,095,973	217,078	884,646	1,101,724	91	56	28,830	*
Cochin	1,200,000	60,698	99,817	160,515	91	7	2,689	30,964
Pudukkottai	400,694	14,555	4,271	18,826	93	66	4,025	7,204

* Information not available.

Appendix VI.

TABLE A.—NUMBER OF TOWNS HAVING PROTECTED WATER SUPPLIES IN DIFFERENT PROVINCES.

	Towns having a population of over 50,000.		Towns having a population between 30,000—50,000.		Towns having a population below 30,000.		Total.			
	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Aggregate population.	Towns having a protected water supply.	Population of towns included in col. 10.
1	2	3	4	5	6	7	8	9	10	11
BRITISH INDIA	75	60	87	45	1,309	148	1,471	26,140,161	253	12,669,503
N.-W. F. P.	1	1	1	1	15	6	17	299,284	8	206,293
Punjab	8	6	11	4	162	30	181	3,020,273	40	1,436,384
Delhi	2	2	...	...	4	3	6	516,101	5	506,306
U. P.	17	12	13	4	412	11	442	5,439,702	27	1,830,376
Bihar	6	5	6	3	57	2	69	1,495,138	10	760,243
Orissa	1	...	2	2	5	...	8	236,056	2	79,341
Bengal	5	5	17	12	96	38	118	2,351,407	55	1,442,223
C. P.	2	2	7	4	103	3	112	1,679,546	9	560,338
Bombay	7	6	12	5	112	18	131	3,806,892	29	2,507,158
Sind	4	3	...	...	22	2	26	685,202	5	456,507
Madras	21	18	18	10	284	23	323	6,190,709	51	2,755,063
Coorg	...	...	...	...	2	1	2	9,827	1	5,995
Assam	...	...	...	...	31	10	31	229,825	10	111,879
Ajmer-Merwara	1	...	...	...	4	1	5	180,199	1	21,397

TABLE B.—EXPENDITURE ON PUBLIC HEALTH BY MUNICIPALITIES IN DIFFERENT PROVINCES DURING 1938-39.

	Income.	Public Health expenditure.	Percentage of total income expended on public health.	Expenditure on			Percentage of the total of cols. 4, 5 & 6 to column 2.
				Conservancy.	Water supply:	Drainage.	
	1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
N.-W. F. P.	24,18,751	4,65,589	19·2	2,41,481	72,824	51,760	78·6
Punjab	2,17,45,771	50,70,556	23·3	17,01,230	12,12,251	14,36,435	85·8
Delhi	1,09,06,490	25,59,666	23·5	7,56,903	10,17,516	4,30,943	86·2
U. P.	2,35,28,922	66,98,316	28·5	27,86,166	24,35,625	7,30,806	88·9
Bihar	55,95,044	18,82,251	33·6	10,60,797	4,54,564	2,17,400	92·1
Orissa	10,70,836	3,00,770	28·1	2,09,733	26,522	28,637	88·1
Bengal†	..	..	..	..	..	..	..
C. P.	1,10,82,799	34,95,822	31·5	11,67,258	11,94,006	2,34,195	74·2
Bombay	6,40,43,303	1,36,18,430	21·3	54,02,230	38,20,305	25,02,946	86·1
Sind†	..	..	..	..	..	..	..
Madras	3,50,97,460	88,80,512	25·3	26,40,425	37,00,269*	14,35,158	87·6
Assam	15,68,113	5,57,565	35·6	3,03,821	1,69,636	31,829	90·6

*Includes certain amount of expenditure on drainage as well.

† Information not available.

TABLE C.—EXPENDITURE ON PUBLIC HEALTH BY DISTRICT BOARDS IN DIFFERENT PROVINCES DURING 1938-39.

	Income.	Public Health expenditure.	Percentage of total income expended on public health.	Expenditure on			Percentage of the total of cols. 4, 5 & 6 to column (2).
				Conservancy.	Water supply.	Drainage.	
	1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
N.-W. F. P.	21,01,331	93,090	4·4	7,499	22,232	1,532	33·6
Punjab	2,59,60,055	9,13,802	3·5	*	*	*	..
Delhi	3,68,286	53,721	14·6	18,939	..	..	35·3
U. P.‖	..	..	..	..	..	..	..
Bihar	1,72,06,940	6,33,438	36·8	†	1,42,696	8,918	23·9
Orissa	28,44,403	1,70,665	6·0	11,496	23,335	1,210	21·1
Bengal‖	..	..	..	..	..	..	..
C. P.	1,02,92,378	2,36,792	2·3	..	43,441	50	18·4
Bombay	2,36,67,839	7,29,481	3·1	..	4,04,458	..	55·4
Sind‖	..	..	..	..	..	..	..
Madras	6,05,95,168	47,37,204	7·8	9,71,736	2,59,337‡	§	26·0
Assam	41,77,067	1,58,598	3·8	..	76,657	2,400	49·8

*Figures are not available.
†Separate figures are not available.
‡Includes expenditure on drainage as well.
§Included under expenditure on water supply.
‖Information not available.

Appendix VII.

List of scientific papers published in the Indian Journal of Medical Research, the Indian Medical Gazette and the Journal of the Malaria Institute of India during 1939*.

A.—Papers published in the Indian Journal of Medical Research.

Ahuja, M. L. and Singh, G.

Observations on the ' H ' antigen of vibrios. (Volume XXVII, No. 2).

Anderson, W. M. E.

Observations on *P. papatasii* in the Peshawar district, Part I. (Volume XXVII, No. 2).

Aykroyd, W. R., and Krishnan, B. G.

A diet survey of families with leprosy. (Volume XXVI, No. 4). The defects of tapioca as a staple food. (Volume XXVII, No. 1). A further experiment on the value of calcium lactate for Indian Children. (Volume XXVII, No. 2).

Bagchi, K. N. Ganguly, H. D. and Sirdar, J. N.

Lead in human tissues. (Volume XXVI, No. 4).

Basu, B. C. and Rao, S. S.

Studies on filariasis transmission. (Volume XXVII, No. 1).

Basu, K. P. and Basak, M. N.

Studies in human metabolism. Part I. Protein metabolism in Indians. (Volume XXVII, No. 1).

Basu, K. P., Basak, M. N., and Rai Sircar, B. C.

Studies in human metabolism. Part II. Calcium and phosphorus metabolism in Indians on rice and on wheat diets. (Volume XXVII, No. 2).

Basu, K. P., Bose, S. P., Quader, M. A., and De, H. N.

Available carbohydrate and acid-base balance in pulses. (Volume XXVI, No. 3).

Basu, P. N.

Flocculation test with *Clostridium septique* toxin and antitoxin. (Volume XXVII, No. 2).

Biswas, H. G., and Das, K. L.

Vitamin C content of the chillies, onion and garlic, both in the raw state and when boiled with water. (Volume XXVII, No. 1).

Bose, J. P., and De, U. N.

Relations of inorganic phosphate to carbohydrate metabolism in normal and diabetic subjects. (Volume XXVI, No. 3).

Bose, S.

The nutritive value of papain-mutton broth. (Volume XXVII, No. 1).

Note on the preparation of an unpurified mannose solution for bacteriological use. (Volume XXVII, No. 1).

Chopra, R. N., and Chopra, G. S.

The present position of hemp-drug addiction in India, *Indian Medical Research Memoir*, No. 31.

Chopra, R. N., and Ganguly, S. C.

Abstinence symptoms in opium addiction and rôle of glucose in their treatment. (Volume XXVI, No. 3).

Chopra, R. N., and Rao, S. S.

Chemotherapy of filarial infection. (Volume XXVII, No. 2).

* It is not claimed that the list is complete.

Choudhury, S. C., and Basu, U. P.

On copper content of foods. (Volume XXVI, No. 4).

Das Gupta, C. R.

The action of leucopoietic drugs. (Volume XXVI, No. 4).

David, J. C., and Krishnaswami, R.

The use of dogs for the standardization of digitalis. (Volume XXVII, No. 1).

De, S. S.

Studies on haemolysin of cobra venom. Part I. Investigations on the isolation of haemolysin from cobra (*Naja Naja*) venom. (Volume XXVII, No. 2).

Dhayagude, R. G., and Khadilkar, V. N.

True achlorhydria and anæmia. (Volume XXVI, No. 3).

Fernando, P. B., D'Silva, M., Stork, G. K. B. and Sinnatamby, G. R.

Tetrachlorethylene in the treatment of hookworm disease, with special reference to toxicity. (Volume XXVI, No. 3).

Ghosh, B. N., De., S. S., and Bhattacharya, D. P.

Investigation on the isolation of the active principles from venoms of *Bungarus fasciatus* and *Vipera russellii*. (Volume XXVI, No. 3).

Ghosh, B. N., and Ray, N. N.

Investigation on the occurrence of the Danysz phenomenon in diphtheria toxin-antitoxin mixtures under a variety of conditions. (Volume XXVI, No. 3).

Giri, K. V.

Indian gooseberries (*Phyllanthus emblica* Linn.) as a source of vitamin C. (Volume XXVII, No. 2).

Giri, K. V., and Shouri, K. L.

Serum-phosphatase activity in rats fed on a poor South Indian diet variously supplemented. (Volume XXVII, No. 1).

Gokhale, S. K.

Non-protein nitrogenous constituents of blood : A study based on the examination of 120 normal Indian men. (Volume XXVI, No. 3).

Goyle, A. N.

Observations on haemolysis by vibrios. (Volume XXVI, No. 3).

Greval, S. D. S., Chandra, S. N., and Das, B. C.

On Wassermann reaction. Part IV. The antigen. (Volume XXVII, No. 2).

Greval, S. D. S., Chandra, S. N., and Woodhead, L. S. F.

On M and N in blood groups : the technique of typing, the antifluids, findings in 300 Indians, and associated considerations. (Volume XXVI, No. 4).

Greval, S. D. S., Lowe, J., and Bose, R.

Complement fixation in leprosy with Witebsky, Klingenstein and Kuhn (W. K. K.) antigen. A new technique. (Volume XXVI, No. 3).

Greval, S. D. S., Sen Gupta, P. C., and Napier, L. E.

Serological reactions in kala-azar : complement-fixation, false Wassermann reaction and high anti-complementary titre. (Volume XXVII, No. 1).

Guha, R. C., and Ahmad, B.

Observations on the vitamin B excretion of four healthy subjects living on different Indian diets. (Volume XXVII, No. 2).

Iyengar, M. O. T.

Differentiation of microfilariæ of *Wuchereria bancrofti* and *Filaria malayi*. (Volume XXVII, No. 2).

Iyer, P. V. S., and Reghavachari, T. N. S.

The technique of the methyl-red and Voges-Proskaue tests used in the bacteriological analysis of water. (Volume XXVI, No. 4).

Krishnan, B. G.

Calorie requirements of South Indian children. (Volume XXVI, No. 3).

Diet surveys in the Nilgiris and Travancore. (Volume XXVI, No. 4).

Lahiri, D. C.

Absence of specific antitoxin in persons exposed to risk of tetanus infection. (Volume XXVII, No. 2).

Effect of viscosity of serum on the rate of absorption of antibodies. (Volume XXVII, No. 1).

Effect of tryptic digestion on the toxicity and the anti-genicity of the tetanus toxin-broth. (Volume XXVI, No. 4).

Physico-chemical changes in a therapeutic serum due to concentration and their effect on its absorption. (Volume XXVI, No. 3).

Lal, R. B., Ghosal, S. C., and Mukherji, B.

Investigations on the variation of vibrios in the house fly. (Volume XXVI, No. 3).

Lal, R. B., Mukherji, S. P., Roy, S. C., and Sankaran, G.

Investigations into the epidemiology of epidemic dropsy. Part VIII. Studies on the nature and origin of certain (toxic) substances present in the supplies of mustard oil associated with outbreaks of epidemic dropsy. (Volume XXVII, No. 1).

Lal, R. B., and Roy, S. C.

Investigations into the epidemiology of epidemic dropsy. Part VII. Further field studies and controlled experiments. (Volume XXVII, No. 1).

Lowe, J., and Greval, S. D. S.

Complement-fixation in leprosy and other diseases by the Witebsky, Klingenstein and Kuhn (W. K. K.) antigen. (Volume XXVI, No. 3).

Macdonald, G.

A study of anæmia affecting labourers on Assam tea-estates. (Volume XXVI, No. 4).

Maitra, N. M.

On inhibition of individual types of cholera-bacteriophage by vibrio extracts. (Volume XXVII, No. 1).

Majumdar, B. N.

Note on the assimilation of caroteine by rats from a fat-free diet. (Volume XXVII, No. 2).

Maplestone, P. A., and Panja, D.

Molluscum contagiosum and its virus. (Volume XXVII, No. 1). The complement-fixation test in tuberculous disease of the skin. (Volume XXVII, No. 2).

Mertens, W. K., and Mochtar, A.

An investigation of vibrios in the Netherlands East Indies. (Volume XXVII, No. 1).

Mitra, D. D.

A study of diet and nutrition in North Bengal, Upper Assam and Calcutta. (Volume XXVII, No. 2).

Napier, L. E., and Das Gupta, C. R.

Hæmatological studies in Indians. Part XI. The choice of an anticoagulant. (Volume XXVII. No. 2).

Napier, L. E., Sankaran, G., Swaroop, S., and Rao, M. N.

Hæmatological studies in Indians. Part X. Mean red-cell diameters : standard curves for a Bengalee population. (Volume XXVII, No. 1).

Nath, M. C., and Sen Gupta, T. N.

Sex-hormone activities of artostenone derivatives. Part I. Action of artosterone on sexually immature male rats. (Volume XXVII, No. 1).

Niyogi, S. P., Patwardhan, V. N., and Mordecai, J.

Studies on basal metabolism in Bombay. Part I. (Volume XXVII, No. 1).

Orr, I. M., and Rao, M. V. R.

A contribution to the study of the pathogenesis of peptic ulcer in Indians. (Volume XXVII, No. 1).

Raghavachari, T. N. S., and Iyer, P. V. S.

The Coli-Aerogenes index of pollution used in the bacteriological analysis of water (Volume XXVI, No. 4).

Longevity of *Coliform* organisms in water stored under natural conditions. (Volume XXVI, No. 4).

Rao, M. S.

The nutritional requirements of the plague bacillus. (Volume XXVII, No. 1).

Read, W. D. B.

Differential isolation of *V. cholerœ*. (Volume XXVI, No. 4).

Read, W. D. B., Singh, G., Seal, S. C., and Bose, S.

Growth and survival of *V. cholerœ* with special reference to growth and survival in water. (Volume XXVII, No. 1).

Saha, K. C., and Guha, B. C.

Nutritional investigations on Bengal fish. (Volume XXVI, No. 4).

Seal, S. C.

A preliminary note on the relative efficiency of bismuth sulphite medium and peptone-water enrichment in the isolation of *V. cholerœ* from human and other sources. (Volume XXVII, No. 2).

Seal, S. C., and Mitra, B. N.

Oxidation-reduction potentials of *V. cholerœ* and related organisms. (Volume XXVI, No. 3).

Shourie, K. L.

A survey of diet and nutrition in Najafgarh, Delhi Province. (Volume XXVI, No. 4).

Singh, N.

A study of diet and nutrition in Orissa. (Volume XXVII, No. 2).

Sokhey, S. S.

Experimental studies in plague. Part I. Introduction. (Volume XXVII, No. 2).

Experimental studies in plague. Part II. The solid medium of choice and the optimal temperature of incubation for the growth of the plague bacillus. (Volume XXVII, No. 2).

Experimental studies in plague. Part III. A method for determining the number of viable plague organisms in broth cultures. (Volume XXVII, No. 2).

Experimental studies in plague. Part IV. Experimental animal of choice for plague work. (Volume XXVII, No. 2).

Experimental studies in plague. Part V. A method for measuring the virulence of plague cultures. (Volume XXVII, No. 2).

Experimental studies in plague. Part VI. A method for maintaining the virulence of *Pasteurella pestis*. (Volume XXVII, No. 2).

Sokhey, S. S., Chitre, G. D., and Gokhale, S. K.

The relative value of some proprietary cyanide preparations for the exterminatoin of rats and fleas as a plague-preventive measure. (Volume XXVII, No. 2).

Sokhey, S. S., and Malandkar, M. A.

Basal metabolism of Indians : a study based on the examination of sixty normal Indian men. (Volume XXVII, No. 2).

Strickland, C., and Roy, D. N.

Ticks found on man. (Volume XXVII, No. 1).

Swaminathan, M.

The influence of varying levels of calcium intake on the biological value of proteins. (Volume XXVII, No. 1).

The urinary excretion of nicotinic acid. (Volume XXVII, No. 2).

Vishwa Nath, and Grewal, K. S.

Cancer in India. (Volume XXVI, No. 3).

Wats, R. C., Wagle, P. M., and Puduval, T. K.

A serological study of some strains of *Pasteurella pestis*. (Volume XXVII, No. 2).

B.—Papers published in the Indian Medical Gazette during 1939. Volume LXXIV.

Ahmed, N.

Five years of antimalaria work at Barwadih Railway Settlement. (Page 472).

Aldrich, H. C.

Calcification of renal tumours. (Page 727).

Transplantation of Ureters for inoperable vesico-vaginal fistula. (Page 604).

Allen, F. R. W. K.

Suprapubic lithotomy. (Page 156).

Allen, F. R. W. K., Sharma, G. L., Basu, I. B., Jamdar, C. M., and Panse, K. B.

Failure of sulphanilamide therapy in the treatment of coliform and gonococcal infection of the genito urinary tract. (Page 209).

Allinson, F. W., and Paul, S.

Some experiments on the absorption of insulin with special reference to absorption through the nasal passages. (Page 267).

Ananthachari, M. D.

A typical amyloid disease of the liver. (Page 84).

Bagchi, K. N.

Importance of chemical tests for detection of seminal stains in medico-legal investigations. (Page 683).

Bagchi, K. N., Ganguli, H. D., Mukerji, P. N., and Banerjee, J. N.

A new method for the determination of small quantities of cocaine in presence of novocaine. (Page 29).

Bajaj, N. L.

A note on pellagra with special reference to the district of Kangra (Punjab). (Page 145).

Bakhsh, I.

Preliminary tuberculosis survey of rural areas in the Punjab. (Page 414) Treatment of nervous diseases by vitamin B_1 with special reference to trigeminal neuralgia (a report of seven cases). (Page 456).

Bakhsh, I., and Rabbani, M.

Vitamin C in pulmonary tuberculosis. (Page 274).

Banerjee, S., and Guha, B. C.

The intradermal test as an index of vitamin C nutrition. (Page 335).

Barton, R. M.

Prognostic importance of blood examinations in pulmonary tuberculosis. (Page 572).

Benjamin, P. V., Verghese, M. C., Jesudian, K. T., and Varkkey, C. E.

A tuberculosis survey in a South Indian town. (Page 516).

Bhargava, R. C.

Protection of antiplague workers. (Page 87).

Bose, I. B., Mukerji, B., and Chopra, R. N.

Quality of quinine preparations in Indian hospitals and dispensaries. (Page 609).

Bose, J. P.

Further observations on protamine zinc insulin in clinical diabetes. (Page 719).

Caplan, A.

Treatment of lobar pneumonia with M. & B. 693. (Page 461).

Chand, A., Taylor, G. F., and Chitkara, N. L.

The treatment of pneumonia by May & Baker's 693. Report on 50 cases with controls. (Page 257).

Chopra, R. N.

The drug industry in India and its difficulties. (Page 230).

Chopra, R. N., Basu, B. C. and Sen, S.

Rat-bite fever in Calcutta. (Page 449).

Chopra, R. N., and Chowhan, J. S.

Snake bites and their treatment in India. Part II. The management of sequelæ and complications. (Page 422).

Chopra, R. N., and Das Gupta, B. M.

'M. & B. 693' (2-Sulphanilylamino-pyridine) in the ape malaria. (Page 201).

Chopra, R. N., Das Gupta, B. M., Sen, B. and Ahmed, Z.

Infection with *Giardia lamblia*—Its pathogenicity and treatment. (Page 458).

Chopra, R. N., Das Gupta, B. M., Sen, B., and Hayter, R. T. M.

Prontosil in Indian strains of malaria. (Page 321).

Chopra, R. N., Hayter, R. T. M., and Sen, B.

'M. & B. 693' in Indian strains of malaria. (Page 658).

Chopra, R. N., Pasricha, C. L., Goyal, R. K., Lal, S., and Sen, A. K.

The experimental production of syndrome of epidemic dropsy in man. (Page 193).

Chopra, R. N., and Ray, P. N.

Chronic ulcerative colitis. (Page 65).

Cruickshank, M. M.

Aberrant pancreatic tissue in the alimentary tract. (Page 74).

Tuberculosis of lymphatic glands in the neck. (Page 554).

Cummins, S. L.

The tuberculosis of tropical countries. (Page 513).

Daengsvang, S.

An abdominal tumour caused by *Gnathostoma spinigerum*. (Owen, 1836). (Page 399).

Das, S. K.

Evolution of gold therapy in phthisis. Part I. (Page 277).

Evolution of gold therapy in phthisis. Part II. (Page 326).

Das Gupta, B. M.

Further observations on leptospiral infections in Calcutta. (Page 31).

On the intrauterine infection of the fœtus with *Leptospira icterohæmorrhagiar*. (Page 28).

Malarial infection in the placenta and transmission to the fœtus. (Page 397).

A note upon an interesting serological type of leptospira in the Andamans. (Page 88).

Observations on some immunological aspects of leptospiral infections. (Part I). (Page 220).

Observations on some immunological aspects of leptospiral infections. (Part II). (Page 617).

Some anomalies in the morphology of *plasmodium vivax* occurring in a newborn baby. (Page 273).

Das Gupta, C. R., and Napier, L. E.

Thrombocytosis and spleen extracts. (Page 602).

De, M. N., and Tribedi, B. P.

Chordoma. (Page 465).

The pathogenesis of the commoner types of splenomegaly met with in India. (Page 9).

De, P., and De, B. N.

The vital capacity of the Bengalees. (Page 409).

De, R. K.

Simple technique of giving intravenous quinine with saline. (Page 740).

Dutta, S. C.

Clinical observations on pneumonia occurring in a tea garden in Assam. (Page 260).

Edis-Myers, J.

Willett's forceps. (Page 729).

Frimodt-Möller, C.

Planning of tuberculosis institutions in India. (Page 559).

Ganguli, M. C.

A simple and inexpensive method of intratracheal anœsthesia. (Page 266).

Ghosh, H.

A probable cause of the difficulty of treating chronic amœbic infection in this country. (Page 27).

Ghosh, H., and Mukherjee, S.

The source of streptococcal infection in puerperal fever. (Page 342).

Ghosh, L. M.

A case of moniliasis with a secondary allergic patch or 'Moniliide'. (Page 476).

Gollerkeri, P. G.

Cardio-vascular syphilis and cerebral symptoms. (Page 725).

Primary and secondary tuberculosis. (Page 82).

Goyal, R. K., and Lal, S.

An investigation of Calcutta milk supply for presence of tubercle bacilli. (Page 86).

Titre of complement in a sample of hospital population in Calcutta. (Page 616).

Greval, S. D. S.

The use of blood tests in excluding paternity and maternity. (Page 388).

Greval, S. D. S., and Chandra, S. N.

Difficulties and dangers in providing donors of blood. (Page 461).

Guha Roy, S. C.

Lacithin and glucose in the treatment of the opium habit. (Page 265).

Hamburger, H. J.

Observation on the pathology and therapy of the so-called frontier sore. (Page 151).

Hamid, A.

From warfare to welfare. (Page 753).

Hamilton, C. S. P.

Investigation into the natural breeding places of the *Siphunculina funicola* fly in Assam. (Page 210).

Hare, K. P.

On certain cyclical changes observed in the blood pictures of cases of untreated anæmia complicating pregnancy in tea-estate coolies. (Page 467).

An experiment in coolie line sanitation; effects on health. (Page 340).

Hare, K. P., and Dutta, S. C.

The comparative value of oil of chenopodium and tetrachlorethylene as anthelmintics for use in mass treatment. (Page 198).

Iyengar, N. K., and Mukerji, B.

The quality of medicinal cod-liver oil and its preparations on the Indian market. (Page 215).

James, E. R.

The incidence of plague in Mawchi mines and the advantage of adopting early preventive and prophylactic measures. (Page 347).

Jekyll, N. D.

Treatment of lobar pneumonia with M. & B. 693. (Page 599).

Jones, W. M. G.

Collapse therapy of pulmonary tuberculosis. (Page 537).

Jones, W. M. G., and Bradley Bowron, E. W.

A home made 'Tomoscope'. (Page 618).

Kaikini, V. M.

Tumours of the upper jaw and its immediate neighbourhood. (Page 406).

Kelly, G.

Some notes on clinical heart disease. (Page 129).

Kini, M. G., and Rao, S. V.

A study of treatment of tetanus based on a review of 38 cases from the year 1932-1937. (Page 14).

Konar, N. R., Roy, H. K., and De, M. N.

Clinical observations on Weil's disease in India. (Page 596).

Naphthalene poisoning. (Page 723).

Lahiri, M. N., Das, P. C., and Malik, K. S.

Viability of *vibrio choleræ* in natural waters. (Page 742).

Lall, R., and Townsend, R. S.

Ages of epiphysial union at the elbow and wrist joints amongst Indian girls. (Page 614).

Lambert, D. P.

Preliminary report on the medico-legal value of the finding of blood on nail parings. (Page 744).

Lowe, J.

Leprosy and tuberculosis. (Page 482).

Maplestone, P. A., and Dey, N. C.

A microsporum new to India. (Page 148).

The use of dyes in various fungal infections. (Page 391).

Maplestone, P. A., and Mukerji, A. K.

Eradication of *Hymenolepis nana* infection. (Page 195).

Treatment of trichuris infection with iron. (Page 607).

McRobert, G. R., and Reddy, D. G.

The heart in anæmia. (Page 75).

Mehta, P. M.

Basic principles of solarium treatment. (Page 291).

Minchin, R. L. H.

Clinical and prognostic factors in typhoid in India. (Page 591).

Min Sein.

Clinical notes on the treatment of acute cardiac beri-beri. (Page 344).

Injection method of treating enlarged inguinal glands in early cases of lymphopathis venereum. (Page 270).

Thrombo-angiitis obliterans. Report of a case treated by lumbar ganglionectomy. (Page 404).

Mitra, D. D.

A study of the diet of the Bengali Hindus and their nutrition. (Page 226).

Study of diet in two industrial areas in Assam, with special reference to the incidence of anæmia. (Page 671).

Muktha Bai, B.

Infant mortality in India. (Page 354).

Napier, L. E.

Diagnosis of kala-azar in dispensary practice. (Page 600).

Etiology of tropical macrocytic anæmia. (Page 1).

Pellagra. (Page 136).

Tropical sprue. A résumé of a lecture. (Page 688).

Napier, L. E., Shorten, J. A., and Das Gupta, C. R.

Cooley's erythroblastic anæmia. (Page 660).

Niyogi, S. P., and Sukhatankar, D. R.

Diet survey in Bombay. (Page 674).

Pal, J. C.

Ionisable iron in cows' and mothers' milk. (Page 470).

Pasricha, C. L., Banerjee, K., and Wordsworth, R. F.

Schick test amongst a group of Indians and Anglo-Indians in Calcutta. (Page 395)

Pasricha, C. L., Chatterjee, D. N., and Paul, B. M.

H. & O. agglutinins in cholera patients. (Page 330).

Pasricha, C. L., deMonte, A. J. H., and Gupta, S. K.

A method of filling screw-capped bottles with fluids under sterile conditions. (Page 222).

Pasricha, C. L., deMonte, A. J. H., Chatterjee, B. C., and Samad Mian, A.

Treatment of cholera (a note on the results of treatment by different methods). (Page 400).

Pasricha, C. L., Lahiri, M. N., Das, P. C., and Paul, B. M.

The serological types of vibrios isolated from cholera patients in Calcutta. (Page 680).

Pasricha, C. L., Lahiri, M. N., and Paul, B. M.

Use of the domestic fowl for the preparation of diagnostic antisera. (Page 741).

Pasricha, C. L., and Lal, S.

Bacteriophage in an experimental infection in mice. (Page 681).

Incidence of monilias in human fæces. (Page 682).

Pasricha, C. L., Lal, S., Malik, K. S., and Biswas, P. K.

Outbreak of epidemic dropsy in a closed community. (Page 733).

Pasricha, C. L., Lal, S. and Banerjee, K.

Aschheim Zondek and the Friedman tests in the diagnosis of the life and death of a fœtus. (Page 736).

Pasricha, C. L., and Panja, G.

A macroscopic method for the detection of motility of bacteria and for the study of flagellar antigen relationship. (Page 348).

Patwardhan, K. A.

The disposal and utilization of horse dung and stable litter by composting. (Page 88).

Phipson, E. S.

A note on the medical ethnology of tuberculosis in the hills and frontier tracts of Assam. (Page 624).

Patent medicines, the public and the doctor. (Page 98).

Rajam, R. V., Rangiah, P. N., and Masilamani, T.

Chemotherapy of gonorrhœa and other minor venereal diseases with sulphanilamide compounds. A clinical study. (Page 202).

Rajam, R. V., and Rao, N. V.

Mapharside in the treatment of syphilis : a clinical study. (Page 24).

Raman, T. K.

Coarctation of the aorta. (Page 401).

Rao, K. K.

Treatment of perri-tonsillar abscess. (Page 334).

Rao, M. N.

Diet and peptic ulcer. (Page 167).

Rawlings, G. R.

Intravenous anæsthesia with pentothal sodium. (Page 722).

Reddy, D. G., and Subramaniam, R.

Sternal puncture in kala-azar. (Page 664).

Roy, B. N. C.

The treatment of otitis media. (Page 80).

Roy, K. L., Pal, J. C., and Guha, B. C.

Ionisable iron in certain Indian food-stuffs and in students' dietaries. (Page 281).

Russell, A. J. H.

Public Health—the foundation of nation building. Broadcast talk. (Page 290).

The yellow fever position. (Page 164).

Russell, P. F., and Mohan, B. N.

Experimental malaria infections in two races of *A. stephensi*. (Page 469).

Saha, K. C., Roy, K. L., and Guha, B. C.

The calcium and phosphorus content of students' dietaries. (Page 324).

Salomon, H.

The treatment of acute and chronic diarrhœa with a salt-free diet. (Page 268).

Sanjivi, K. S.

Observations on some epidemiological factors of tuberculosis in South India. (Page 527).

Sarkar, M. N., and Tribedi, B. P.

Arrhenoblastoma. (Page 284).

Sen, P. K.

Pneumonoconiosis with special reference to silicosis, anthracosis and tuberculosis. (Page 547).

Sen Gupta, P. C., Rai Chaudhuri, M. N., Chaudhuri, R. N., and Napier, L. E.

Notes on cases of pellagra encountered in Calcutta. (Page 143).

Shah, M. J.

Lung abscess. (Page 668).

Shah, S. R. A.

Note on some cases of lathyrism in a Punjab village. (Page 385).

Shaha, A. N.

'Neuropoietin principle in gastric secretion'. The ætiology of central nervous symptoms in pernicious anæmia. (Page 692).

Shrikhande, Y. G.

Comparative value of different gold preparations in the treatment of pulmonary tuberculosis. (Page 545).

Sinha, G. N.

Yaws in Chatra subdivision of Hazaribagh district, Chotanagpur. (Page 728).

Sprawson, C.

A medical tour in Russia. (Page 39).

Sreenivasan, A.

Nutritive value of rice. (Page 35).

Strickland, C.

Malaria in Chotanagpur. (Page 737).

Strickland, C., and Roy, D. N.

Scarabiasis or the presence of beetles in the intestine. (Page 416).

A simple means of preventing spider-lick. (Page 285).

Swamy, T. V.

Suggestion for a new type of tube for bacteriological cultures. (Page 741).

Szamek, L. M.

What may we expect from the sub-total hysterectomy? (Page 605).

Taylor, M.

Early schizophrenia. (Page 665).

Taylor, G. F., and Chitkara, N. L.

Report of the use of M. & B. 693 in pneumonia, pneumococcal meningitis and pneumococcal empyema, with reports on two cases of exfoliative dermatitis and one of agranulocytosis due to M. & B. 693. (Page 655).

Ukil, A. C., and De, K. N.

Bronchiectasis. Its ætiology, pathology, diagnosis, prognosis and treatment. (Page 529).

Venkatachalam, K., and Ratnagiriswaran, A. N.

On the efficacy of the gonadotropic hormones in the treatment of whooping cough. (Page 271).

Viswanathan, R.

Complications during artificial pneumothorax therapy. (Page 543).

Whyte, F. H.

The local provision of splints and tackle for fractures and joint infections in India. (Page 77).

C.—Papers published in the Journal of the Malaria Institute of India Volume II, 1939.

Afridi, M. K.

Abstract. *Aedes* survey of Hog Island. (Page 113).

Afridi, M. K., Jaswant Singh, and Harwant Singh.

Food preferences of anopheles mosquitoes in the Delhi urban area. (Page 219).

Banerjea, A. C.

The Gumti Weir, Lucknow. (Page 257).

Note on the manufacture and retail sale of quinine tablets in the rural areas of the United Provinces. (Page 377).

Basu, B. C.

Studies on the biology of the malaria parasite (*Plasmodium falciparum*). (Page 155).

Brink, C. J. H., and Das Chowduri, D. K.

Abstract. Ammonium sulphate as a combined fertilizer and mosquito larvicide. (Page 111).

Burca, B. De.

Note on antimalaria measures in Quetta cantonment during 1938. (Page 121).

Chopra, R. N., and Basu, B. C.

Studies on the effect of antimalarial drugs upon the infectivity of patients to mosquitoes. Part III. 'Prontosil'. (Page 153).

Failure of 'M_3' in prophylaxis of Indian strains of malaria. (Page 253).

Covell, G.

Antimalaria operations in Delhi. Part I. (Page 1).

Covell, G., and Afridi, M. K.

Antimalaria operations in Delhi. Part II. (Page 315).

Covell, G., and Harbhagwan.

Malaria in the Wynaad, South India. (Page 341).

Dikshit, B. B.

Plasmoquine in pregnancy, with special reference to the action on the fœtus. (Page 387).

Gilroy, A.

Health in tea gardens of the Darjeeling Terai with special reference to malaria. (Page 165).

Iyengar, M. O. T.

A year's work on dissection of anopheles for natural malarial infection. (Page 105).

Jaswant Singh, and Harwant Singh.

Treatment of simian malaria with M. & B. 693. (Page 181).

Macdonald, G.

A design of flushing siphon for control of anopheline breeding. (Page 63).

Manson, D.

The action of certain Assamese plants as larvicides. (Page 85).

Mathew, M. I.

Anopheline transmitters of malaria in South Travancore. (Page 101).

Roy, D. N.

The importance of *A. varuna* Iyengar as a carrier of malaria in Bally (Calcutta). (Page 239).

Malaria infection in *Anopheles subpictus* and *Anopheles vagus*. (Page 457).

Roy, D. N., and Majumdar, S. P.

On mating and egg formation in *Culex fatigans* Wied. (Page 243).

Roy, D. N., and Siddons, L. B.

Egg of *A. philippinensis* Ludl. (Page 159).

Russell, Sir Alexander J. H.

A note on the yellow fever position. (Page 115).

Russell, P. F., and Jacob, V. P.

Epidemiology of malaria in the Ennore-Nellore coastal area, Madras Presidency, India. (Page 131).

Some experiments with a cheap method of treating Casuarina-pits with paris green to control anopheles breeding. (Page 261).

Some experiments in the use of fish to control anopheles breeding in Casuarina-pits. (Page 273).

Some experiments in the naturalistic control of anopheles breeding in Casuarina-pits (Page 293).

Russell, P. F., and Knipe, F. W.

Malaria control by spray-killing adult mosquitoes. First season's results. (Page 229).

Russell, P. F., and Mohan, B. N.

On experimental malaria infections in certain anopheles of South-Eastern Madras. (Page 425).

Insectary colonies of *Anopheles stephensi* (Type). (Page 433).

Russell, P. F., Rao, T. R., and Jacob, V. P.

Anopheles subpictus Grassi, 1899, and *Anopheles vagus* Dönitz, 1902, found naturally infected with malaria plasmodia in South-Eastern India. (Page 95).

Russell, P. F., Sweet, W. C., and Menon, M. K.

Some observations on malaria parasite rates in infants in South India. (Page 439).

Senior White, R., and Adhikari, A. K.

On malaria transmission around the Chilka lake. (Page 395).

Sinton, J. A.

A summary of our present knowledge of the mechanism of immunity in malaria (Page 71).

Studies in immunity in malaria. Part VI. The effect of drugs upon the development of immunity and its relationship to the principles of treatment. (Page 191).

Appendix VIII.

TABLE SHOWING SICKNESS AND MORTALITY OF ALL CLASSES

Provinces.	Average daily population.	Constantly sick.	Influenza. Actuals. A.	Influenza. Actuals. D.	Influenza. Ratios. A.	Influenza. Ratios. D.	Cholera. Actuals. A.	Cholera. Actuals. D.	Cholera. Ratios. A.	Cholera. Ratios. D.
India (excluding the Andamans) *.	114,331	20	3,444	16	30	0·1	13	5	0·1	0·04
	109,347	21	3,212	10	29	0·1	17	3	0·2	0·03
	118,795	*23*	*4,230*	*23*	*36*	*0·2*	*17*	*4*	*0 1*	*0·03*
N.-W. F. P.	5,424	18	9	...	2	...	...	...	...	...
	5,643	23	60	1	11	0·2	...	...	...	...
	6,236	*25*	*86*	...	*14*	....	...	...	...	...
Punjab	18,350	17	213	3	12	0·2	...	...	...	...
	17,624	18	159	2	9	0·1	1	...	0·06	...
	19,040	*22*	*167*	*1*	*9*	*0·05*	...	...	...	...
U. P.	32,895	16	372	...	11	...	11	5	0·3	0·2
	28,768	17	433	1	15	0·03	15	3	0·5	0·1
	30,637	*19*	*882*	*7*	*29*	*0·2*	*13*	*3*	*0·4*	*0·1*
Bihar	9,707	19	323	3	33	0·3	1	...	0·1	...
	9,036	20	146	...	16	...	...	...	...	...
	9,479	*23*	*323*	*3*	*34*	*0·3*	*2*	...	*0·2*	...
Orissa	987	21	106	1	107	1·0	...	...	...	...
	1,076	20	24	...	22	...	...	...	...	...
	1,016	*25*	*25*	...	*25*	...	...	...	...	...
Bengal	16,774	39	1,956	6	117	0·4	1	...	0·06	...
	16,992	38	1,803	3	106	0·2	...	...	...	...
	19,267	*38*	*2,078*	*5*	*108*	*0·3*	*2*	...	*0·1*	...
C. P.	4,404	14	84	1	19	0·2	...	...	...	...
	3,996	15	111	...	28	...	...	...	...	...
	4,360	*10*	*111*	*3*	*25*	*0·7*	...	...	...	...
Bombay	6,696	18	160	1	24	0·1	...	...	...	...
	6,926	18	88	...	13	...	...	...	...	...
	7,515	*20*	*95*	...	*13*	...	...	...	...	...
Sind	3,675	18	...	...	...	...	...	...	...	...
	3,722	21	...	...	...	...	1	...	0·3	...
	3,789	*23*	*8*	...	*2*	...	...	...	...	...
Madras	10,580	11	136	...	13	...	...	...	...	...
	10,255	14	187	...	18	...	...	...	...	...
	11,665	*16*	*310*	*1*	*27*	*0·09*	...	...	...	...
Assam	3,216	24	37	1	12	0·3	...	...	...	...
	3,304	24	102	2	31	0·6	...	...	...	...
	3,782	*23*	*104*	*1*	*27*	*0·3*	...	...	...	...

* The sickness and mortality figures relating to the Andamans have been dealt with in Paragraph 33 of this report.

A.—Admissions; D -Deaths.

OF PRISONERS IN DISTRICT AND CENTRAL JAILS IN INDIA.

Smallpox.				Enteric fever.				Malaria.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
31	3	0·3	0·03	301	33	3	0·3	9,819	23	86	0·2
25	1	0·2	0·01	301	26	3	0·2	12,383	24	113	0·2
46	*3*	*0·4*	*0·03*	*247*	*31*	*2*	*0·3*	*17,148*	*53*	*144*	*0·4*
...	...	...	...	21	2	4	0·4	450	2	83	0·4
3	...	0·5	...	28	1	5	0·2	607	2	108	0·4
1	...	*0·2*	...	*32*	*4*	*5*	*0·6*	*878*	*3*	*141*	*0·5*
...	...	...	...	78	10	4	0·5	1,232	5	67	0·3
4	...	0·2	...	68	3	4	0·2	1,607	1	91	0·0
5	...	*0·3*	...	*62*	*6*	*3*	*0·3*	*3,389*	*10*	*178*	*0·6*
20	1	0·6	0·03	91	1	3	0·03	4,139	5	126	0·2
14	...	0·5	...	51	8	2	0·3	3,396	2	118	0·1
20	*1*	*0·7*	*0·03*	*32*	*3*	*1*	*0·1*	*4,373*	*6*	*143*	*0·2*
2	...	0·2	...	44	7	5	0·7	388	3	40	0·3
1	1	0·1	0·1	51	4	6	0·4	436	3	48	0·3
2	...	*0·2*	...	*28*	*4*	*3*	*0·4*	*455*	*4*	*48*	*0·4*
...	...	...	...	...	...	...	...	41	...	42	...
...	...	...	...	2	...	2	...	56	...	52	...
...	...	...	...	...	...	...	...	*64*	...	*63*	...
2	2	0·1	0·1	33	4	2	0·2	2,961	16	32	0·6
2	...	0·2	...	40	4	2	0·2	3,418	10	201	0·6
12	*1*	*0·6*	*0·05*	*28*	*5*	*1*	*0·3*	*4,358*	*18*	*226*	*0·9*
...	...	...	...	2	...	0·5	...	329	3	75	0·7
...	...	...	...	3	1	0·8	0·3	335	...	84	...
1	...	*0·2*	...	*3*	...	*0·7*	...	*225*	*1*	*52*	*0·2*
3	...	0·4	...	18	5	3	0·7	1,149	1	172	0·1
...	...	...	...	14	1	2	0·1	930	2	134	0·3
...	...	...	...	*16*	*2*	*2*	*0·3*	*1,275*	*3*	*170*	*0·4*
...	...	...	...	5	...	1	...	1,086	...	296	...
...	...	...	...	19	2	5	0·5	1,015	1	278	0·3
...	...	...	...	*17*	*2*	*4*	*0·5*	*1,181*	*1*	*312*	*0·3*
...	...	...	...	4	2	0·4	0·2	111	...	10	...
...	...	...	...	12	1	1	0·1	198	2	19	0·2
1	...	*0·09*	...	*14*	*2*	*1*	*0·2*	*229*	*3*	*20*	*0·3*
2	...	0·6	...	4	2	1	0 6	223	3	69	0·9
...	...	...	...	10	...	3	...	203	1	61	0·3
...	...	...	...	*8*	*1*	*2*	*0·3*	*360*	*2*	*95*	*0·5*

NOTE.—The three figures against each administrative group are those for (1) 1939, (2) 1938 and (3) 1934-38. The rates have been calculated *per mille* of the average daily population.

TABLE SHOWING SICKNESS AND MORTALITY OF ALL CLASSES

Provinces.	Average daily population.	Constantly sick.	Pyrexia of uncertain origin.				Tubercle of the lungs.			
			Actuals.		Ratios.		Actuals.		Ratios.	
			A.	D.	A.	D.	A.	D.	A.	D.
India (excluding the Andamans)*	114,331	20	1,228	4	11	0·03	720	141	6	1·2
	109,347	21	1,099	2	10	0·02	716	177	7	1·6
	118,795	*23*	*922*	*4*	*8*	*0·03*	*699*	*231*	*6*	*1·9*
N.-W. F. P.	5,424	18	27	...	5	...	41	2	8	0·4
	5,643	23	15	...	3	...	58	12	10	1·1
	6,236	*25*	*24*	...	*4*	...	*57*	*19*	*9*	*3·0*
Punjab	18,350	17	390	1	21	0·05	83	5	5	0·3
	17,624	18	201	2	11	0·1	134	29	8	1·6
	19,040	*22*	*220*	*2*	*12*	*0·1*	*153*	*50*	*8*	*2·6*
U. P.	32,395	16	234	1	7	0·03	143	36	4	1·0
	28,768	17	219	...	8	...	137	28	5	1·0
	30,637	*19*	*246*	...	*8*	...	*106*	*34*	*3*	*1·1*
Bihar	9,707	19	60	...	6	...	82	17	8	1·8
	9,036	20	59	...	7	...	78	20	9	2·2
	9,479	*23*	*17*	...	*2*	...	*76*	*35*	*8*	*3·7*
Orissa	987	21	...	...	...	...	9	3	9	3·0
	1,076	20	...	...	...	...	...	2	...	1·9
	1,016	*25*	...	...	..	...	*4*	*2*	*4*	*2·0*
Bengal	16,774	39	262	...	16	...	142	28	9	1·7
	16,992	38	468	...	27	...	132	35	8	2·1
	19,267	*38*	*320*	...	*17*	...	*117*	*35*	*6*	*1·8*
C. P.	4,404	14	58	...	13	...	31	5	7	1·1
	3,996	15	20	...	5	...	19	4	5	1·0
	4,360	*10*	*31*	*1*	*7*	*0·2*	*19*	*6*	*4*	*1·4*
Bombay	6,696	18	13	1	2	0·1	59	12	9	1·8
	6,926	18	7	...	1	...	25	9	4	1·3
	7,515	*20*	*7*	...	*1*	...	*29*	*14*	*4*	*1·9*
Sind	3,675	18	60	...	16	...	14	3	4	0·8
	3,722	21	18	...	... 5	...	21	8	6	2·1
	3,789	*23*	*6*	...	*2*	...	*15*	*6*	*4*	*1·6*
Madras	10,580	11	97	...	9	...	66	17	6	1·6
	10,255	14	70	...	7	...	64	16	6	1·6
	11,665	*16*	*28*	...	*2*	...	*72*	*17*	*6*	*1·5*
Assam	3,216	24	5	...	2	...	38	12	12	3·7
	3,304	24	13	...	4	...	39	12	12	3·6
	3,782	*23*	*9*	...	*2*	...	*40*	*11*	*11*	*2·9*

* The sickness and mortality figures relating to the Andamans have been dealt with in Paragraph 33 of this report.

A.—Admissions; D.—Deaths.

OF PRISONERS IN DISTRICT AND CENTRAL JAILS IN INDIA—*contd.*

Pneumonia.				Other respiratory diseases.				Dysentery.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
1,038	194	9	1·7	3,671	132	32	1·2	3,944	81	34	0·7
933	195	9	1·8	3,229	53	30	0·5	3,999	81	37	0·7
1,235	*265*	*10*	*2·2*	*3,627*	*51*	*31*	*0·4*	*4,082*	*92*	*34*	*0·8*
65	5	12	0·9	306	...	56	...	17	1	3	0·2
63	15	11	2·7	121	...	21	...	25	...	4	...
115	*22*	*18*	*3·5*	*235*	*2*	*38*	*0·3*	*40*	*1*	*6*	*0·2*
144	21	8	1·1	686	31	37	1·7	53	...	3	...
130	22	7	1·2	769	2	44	0·1	67	1	4	0·06
169	*35*	*9*	*1·8*	*779*	*4*	*41*	*0·2*	*231*	*5*	*12*	*0·3*
332	81	10	2·5	945	23	29	0·7	330	9	25	0·3
233	50	8	1·7	687	22	24	0·8	512	7	18	0·2
260	*63*	*8*	*2·1*	*787*	*15*	*26*	*0·5*	*444*	*8*	*14*	*0·3*
75	11	8	1·1	258	3	27	0·3	303	7	31	0·7
74	13	8	1·4	245	4	27	0·4	480	16	53	1·8
101	*22*	*11*	*2·3*	*277*	*4*	*29*	*0·4*	*492*	*14*	*52*	*1·5*
1	...	1	...	24	2	24	2·0	9	1	9	1·0
4	1	4	0·9	18	1	17	0·9	30	2	28	1·9
3	*3*	*3*	*3·0*	*18*	...	*18*	...	*41*	*2*	*29*	*2·0*
194	29	12	1·7	792	39	47	2·3	1,415	30	84	1·8
138	28	8	1·7	634	7	37	0·4	1,498	22	88	1·3
224	*46*	*12*	*2·4*	*748*	*9*	*39*	*0·5*	*1,353*	*28*	*70*	*1·5*
50	13	11	3·0	63	6	14	1·4	408	6	93	1·4
50	15	13	4·0	35	7	9	1·8	428	8	107	2·0
41	*12*	*9*	*2·8*	*43*	*4*	*10*	*0·9*	*195*	*6*	*45*	*1·4*
42	6	6	0·9	159	16	24	2·4	101	1	15	0·1
32	5	5	0·7	150	1	22	0·1	177	3	26	0·4
43	*8*	*6*	*1·1*	*160*	*2*	*21*	*0·3*	*192*	*2*	*26*	*0·3*
40	2	11	0·5	128	...	35	...	149	...	41	...
104	17	28	4·6	172	...	46	...	147	3	39	0·8
113	*19*	*30*	*5·0*	*179*	*1*	*47*	*0·3*	*275*	*4*	*73*	*1·1*
45	12	4	1·1	99	2	9	0·2	264	5	25	0·5
44	11	4	1·1	143	4	14	0·4	289	6	28	0·6
63	*14*	*5*	*1·2*	*131*	*6*	*11*	*0·5*	*382*	*10*	*33*	*0·9*
43	12	13	3·7	107	6	33	1·9	348	21	108	6·5
47	12	14	3·6	135	...	41	...	315	13	95	3·9
69	*16*	*18*	*4·0*	*178*	*2*	*47*	*0·5*	*362*	*11*	*96*	*2·9*

NOTE.—The three figures against each administrative group are those for (1) 1939, (2) 1938 and (3) 1934-38. The rates have been calculated *per mille* of the average daily population.

TABLE SHOWING SICKNESS AND MORTALITY OF ALL CLASSES

Provinces.	Average daily population.	Constantly sick.	Diarrhœa. Actuals. A.	Actuals. D.	Ratios. A.	Ratios. D.
India (excluding the Andamans).*	114,331	20	1,690	12	15	0·1
	109,347	21	1,824	17	17	0·2
	118,795	*23*	*2,316*	*19*	*19*	*0·2*
N.-W. F. P.	5,424	18	9	1	2	0·2
	5,643	34	34	1	6	0·2
	6,236	*25*	*27*	*1*	*4*	*0·2*
Punjab	18,350	17	191	2	10	0·1
	17,624	18	140	...	8	...
	19,040	*22*	*216*	*4*	*11*	*0·2*
U. P.	32,895	16	463	6	14	0·2
	28,768	17	420	6	15	0·2
	30,637	*19*	*390*	*5*	*13*	*0·2*
Bihar	9,707	19	56	...	6	...
	9,036	20	108	1	12	0·1
	9,479	*23*	*128*	...	*14*	...
Orissa	987	21	7	...	7	...
	1,076	20	17	...	16	...
	1,016	*25*	*32*	...	*31*	...
Bengal	16,774	39	615	...	37	...
	16,992	38	644	6	38	0·4
	19,267	*38*	*1,053*	*3*	*55*	*0·2*
C. P.	4,404	14	94	1	21	0·2
	3,996	15	41	2	10	0·5
	4,360	*10*	*69*	*2*	*16*	*0·5*
Bombay	6,696	18	110	1	16	0·1
	6,926	18	169	...	24	...
	7,515	*20*	*182*	...	*24*	...
Sind	3,675	18	105	...	29	...
	3,722	21	183	...	49	...
	3,789	*23*	*133*	*1*	*35*	*0·3*
Madras	10,580	11	23	1	2	0·09
	10,255	14	31	...	3	...
	11,665	*16*	*29*	*1*	2	*0·09*
Assam	3,216	24	12	...	4	...
	3,304	24	13	1	4	0·3
	3,782	*23*	*28*	...	7	...

* The sickness and mortality figures relating to the Andamans have been dealt with in paragraph 33 of this report.

A.—Admissions; D.—Deaths.

OF PRISONERS IN DISTRICT AND CENTRAL JAILS IN INDIA—*concld.*

Anæmia and Debility.				All Causes.			
Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.
1,051	33	9	0·3	54,100	982	473	9
912	33	8	0·3	52,828	1,002	479	9
973	*35*	*8*	*0·3*	*63,655*	*1,804*	*535*	*11*
18	...	3	...	1,858	20	343	4
32	...	6	...	2,123	44	376	8
26	...	*4*	...	*2,765*	*69*	*443*	*11*
104	5	6	0·3	6,985	114	381	6
88	1	5	0·06	7,678	105	436	6
113	*3*	*6*	*0·2*	*10,778*	*195*	*566*	*10*
249	5	8	0·2	14,275	244	434	7
164	5	6	0·2	12,388	203	429	7
171	*4*	*6*	*0·1*	*14,376*	*235*	*469*	*8*
11	...	1	...	2,717	91	280	9
14	2	15	0·2	2,801	95	310	11
19	*2*	*2*	*0·2*	*3,205*	*146*	*338*	*15*
1	1	1·0	1·0	372	10	377	10
11	...	10	...	310	18	288	17
8	...	*9*	...	*392*	*15*	*386*	*15*
411	5	25	0·3	16,755	187	999	11
324	8	19	0·5	15,294	179	900	11
352	*8*	*15*	*0·4*	*18,690*	*230*	*970*	*12*
63	3	14	0·7	1,535	68	349	15
45	4	11	1·0	1,417	84	355	21
30	*3*	*7*	*0·7*	*1,144*	*71*	*262*	*16*
78	1	12	0·1	3,164	48	473	7
104	2	15	0·3	3,075	55	444	8
78	*3*	*10*	*0·4*	*3,691*	*70*	*491*	*9*
35	2	10	0.5	2,443	22	665	6
37	1	10	0·3	2,637	53	705	14
27	*1*	*7*	*0·3*	*2,847*	*61*	*751*	*16*
38	2	4	0·2	2,061	74	195	7
44	3	4	0·3	2,396	79	234	8
74	*5*	*6*	*0·4*	*2,670*	*121*	*229*	*10*
26	8	8	2·5	1,092	85	340	26
39	6	12	1·8	1,155	64	350	19
58	*6*	*16*	*1·6*	*1,673*	*64*	*442*	*17*

NOTE.—The three figures against each administrative group are those for (1) 1939, (2) 1938 and (3) 1934-38. The rates have been calculated *per mille* of the average daily population.

GIPD—562 PHC—30-7-41—1,150.

NOV 1 0 1941

HC.2.40
1,300

ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1940

LIBRARY
OF THE
ROYAL ASIATIC SOCIETY

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI.
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI
1941.

Price Annas 12 or 1sh.

ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1940

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI
PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI
1941

List of Agents in India and Burma from whom Government of India Publications are available.

ABBOTTABAD—English Book Store.

AGRA—
English Book Depot, Taj Road.
Indian Army Book Depot, Dayalbagh.

AHMEDABAD—H. L. College of Commerce, Co-operative Store, Ltd.

AJMER—Banthiya & Co., Ltd., Station Road.

AKOLA—Bakshi, Mr. M. G.

ALLAHABAD—
Central Book Depot, 44, Johnstonganj.
Kitabistan, 17-A, City Road.
Ram Narain Lal, 1, Bank Road.
Superintendent, Printing and Stationery, U. P.
Wheeler & Co., Messrs. A. H.

BOMBAY—
Co-operators' Book Depot, 9, Bakehouse Lane, Fort.
International Book House, Ash Lane, Esplanade Road.
Joshi, Mr. V. G., News Agent, Devgad Baria *Via* Piplod.
Kothari Book Depot.
Lakhani Book Depot, Bombay, 4.
New Book Co., Kitab Mahal, 188-90, Hornby Road.
Popular Book Depot, Grant Road.
Superintendent, Govt. Printing & Stationery, Queen's Road.
Taraporevala Sons & Co., Messrs. D. B.
Thacker & Co., Ltd.
Trinathi & Co., Messrs. N. M., Princess Street, Kalbadevi Road.
Wheeler & Co., Messrs. A. H.

CALCUTTA—
Book Company.
Chatterjee & Co., 3, Bacharam Chatterjee Lane.
Chukervertty, Chatterjee & Co., Ltd., 13, College Square.
Das Gupta & Co., 54/3, College Street.
Hindu Library, 137-F, Balaram De Street.
Lahiri & Co., Ltd., Messrs. S. K.
Macmillan & Co., Ltd., 294, Bow Bazar Street.
Newman & Co., Ltd., Messrs. W.
Roy Chowdhury & Co., Messrs. N. M., 72, Harrison Road.
Sarcar & Sons, Messrs. M. C., 15, College Square.
Sarkar & Sons, Ltd., Messrs. S. C., 1/1/1C., College Square.
Standard Law Book Society, 79/1, Harrison Road.
Thacker, Spink & Co. (1933), Ltd.
Wheeler & Co., Messrs. A. H.

CAWNPORE—
Advani & Co., P. O. Box No. 100.
Indian Army Depot, Juhi.

CUTTACK—Press Officer, Orissa Secretariat.

DEHRA DUN—
Jugal Kishore & Co.
Ideal Book Depot, Rajpur Road.

DELHI—
Imperial Book Depot and Press, Near Jama Masjid. (Machhliwalan).
Income-tax Law Publishing House, Chandni Chowk.*
Indian Army Book Depot, Daryaganj.
Jaina & Bros., Messrs. J. M., Mori Gate.
Oxford Book and Stationery Co.
Sharda Mandir, Ltd., Nai Sarak.
Young Man & Co. (Regd.), Egerton Road.

DUM DUM CANTT.—Bengal Flying Club.†

FEROZEPUR—English Book Depot.

GWALIOR—Jain & Bros., Messrs. M. B., Sarafa Road.

HYDERABAD (DECCAN)—Hyderabad Book Depot, Chaderghat.

JAIPUR—Garg Book Co., Tripolia Bazar.

KARACHI—
Aero Stores.
English Bookstall.
Standard Bookstall.

KARACHI (SADAR)—Manager, Sind Government Book Depot and Record Office.

LAHORE—
Kansil & Co., Messrs. N. C., 9, Commercial Buildings, The Mall.
Malhotra & Co., Messrs. U. P., Post Box No. 94.
Minerva Book Shop, Anarkali Street.
Punjab Religious Book Society.
Rama Krishna & Sons, Anarkali.
Superintendent, Govt. Printing, Punjab.
University Book Agency, Kacheri Road.

LUCKNOW—Upper India Publishing House, Ltd. Literature Palace, Aminuddaula Park.

LYALLPORE—Lyall Book Depot.

MADRAS—
Higginbothams.
Superintendent, Govt. Press, Mount Road.
Varadachary & Co., Messrs. P.

MHOW—British Book Depot.

MOGA—Army Musketry Stores.

NAGAPATAM—Venkataraman, Mr. B.

NAGPUR—
Khot & Sons, Messrs. G. G., Sita Burdi, 3rd Modi Lane.
Superintendent, Govt. Printing, Central Provinces.

NEW DELHI—
Bawa Harkishen Das Bedi, Ferozeshah Road.
Bhawnani & Sons.
Delhi and U. P. Flying Club, Ltd.†
Jaina & Bros., Messrs. J. M., Connaught Place.
Ramesh Book Depot & Stationery Mart, Connaught Place.
Saraswati Book Depot, 15, Lady Hardinge Road.
PATNA—Superintendent, Government Printing, Bihar, P. O. Gulzarbagh.

PATNA CITY—
Lakshmi Trading Co., Padri-Ki-Haveli.
Raghunath Prasad & Sons.
Sinha & Bros. Messrs. R. P., Guzri Bazar.

PESHAWAR—
British Stationery Mart.
London Book Co. (India), Arbab Road.
Manager, Govt. Printing & Stationery, N.-W. F. P.

PESHAWAR CANTT.—Faqir Chand Marwah.

POONA—
Deccan Bookstall, Fergusson College Road.
Dastane Bros. Home Service, 456, Rawiwar Peth.
International Book Service.
Ram Krishna Bros., Opposite Bishram Bagh.

QUETTA.—Standard Bookstall.

RAJKOT—Mohanlal Dossabhai Shah.

RANGOON—
Burma Book Club, Ltd.
Curator, Govt. Book Depot, Burma.

RAWALPINDI—Ray & Sons, Messrs. J., 43, K. & L. Edwardes Road.

SHILLONG—Superintendent, Assam Secretariat Press.

SIALKOT CANTT.—Modern Book Depot, Bazar Road.

SIALKOT CITY—
Buckingham & Co., Booksellers & Stationers.
Greenwood Street.
Clifton & Co.

TRICHINOPOLY FORT—Krishnaswami & Co., Messrs. S., Teppakulam.

TRIVANDRUM—
Booklovers' Resort, Taikad.
P. R. Bros. Main Road.

VELLORE—Venkatasubban, Mr. A., Law Bookseller.

*Agents for Income-Tax, Law and allied Publications only.

†Agents for Publications on Aviation only.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1940.

TABLE OF CONTENTS.

SECTION I.

INTRODUCTION.

PARA.		PAGE.
1.	Introduction	1

SECTION II.

HISTORY OF THE CHIEF DISEASES.

2.	Cholera	5
3.	Plague	9
4.	Smallpox	11
5.	Malaria	15
6.	Enteric fever	23
7.	Tuberculosis	25
8.	Leprosy	29
9.	Kala-azar	34
10.	Cerebrospinal fever	35

SECTION III.

HEALTH ACTIVITIES OF THE CENTRAL AND PROVINCIAL PUBLIC HEALTH DEPARTMENTS.

11.	Introduction	36
12.	Rural health	39
13.	Famine relief	43
14.	North-West Frontier Province	46
15.	Punjab	46
16.	Delhi	48
17.	United Provinces	50
18.	Bihar	51
19.	Orissa	52
20.	Bengal	52
21.	Central Provinces	53
22.	Bombay	54
23.	Sind	54
24.	Madras	55
25.	Coorg	56
26.	Assam	56

SECTION IV.

MATERNITY AND CHILD WELFARE.

27.	Introduction	58
28.	Remarks on individual provinces	60

SECTION V.

PORT HEALTH ADMINISTRATION.

PARA.		PAGE.
29.	Introduction	65
30.	Prevalence of infectious diseases in ports	65
31.	Port of Bombay	68
32.	Port of Karachi	69
33.	Karachi Marine Airport	71
34.	Karachi Airport	71
35.	Port of Calcutta	72
36.	Calcutta Marine Airport	73
37.	Dum Dum Aerodrome	74
38.	Port of Madras	75
39.	Port of Chittagong	75
40.	Port of Vizagapatam	76

SECTION VI.

HEALTH ADMINISTRATION ON INDIAN RAILWAYS.

41.	Introduction	77
42.	North Western Railway	78
43.	Bombay, Baroda and Central India Railway	78
44.	Madras and Southern Mahratta Railway	79
45.	South Indian Railway	80
46.	Great Indian Peninsula Railway	80
47.	East Indian Railway	81
48.	Eastern Bengal Railway	82
49.	Bengal and North Western Railway	83
50.	Assam Bengal Railway	83
51.	Bengal Nagpur Railway	84

SECTION VII.

HEALTH OF JAILS IN BRITISH INDIA.

52.	General	86
53.	Population, accommodation and overcrowding	86
54.	Sickness and mortality	87
55.	Weight of prisoners	88
56.	Remarks on individual provinces	89
57.	The Andamans	92
58.	Conclusion	94

SECTION VIII.

MEDICAL RESEARCH.

59.	Introduction	95
60.	Nutrition	96
61.	Maternal mortality	98
62.	Cholera	99
63.	Plague	100
64.	Malaria	100
65.	Leprosy	102

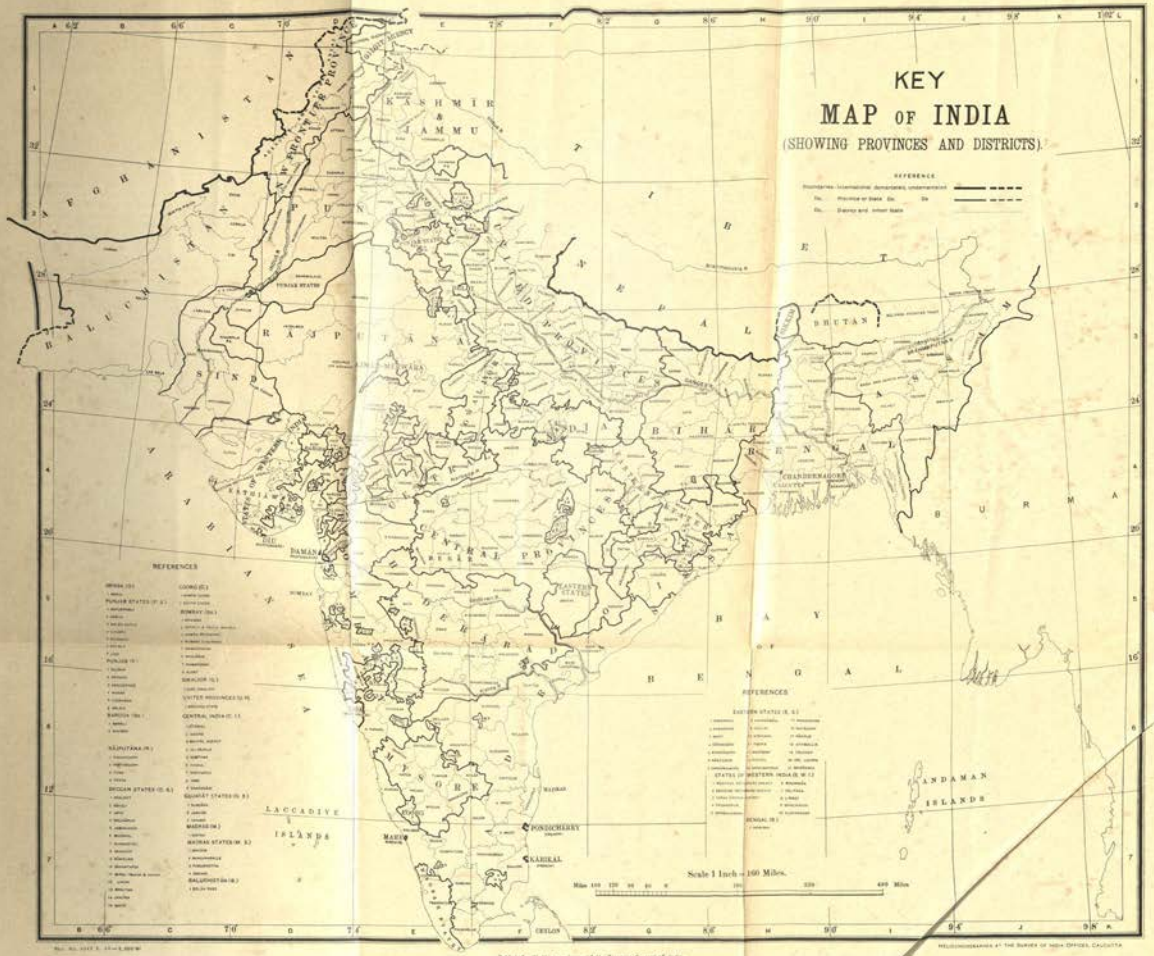
SECTION IX.

VOLUNTARY ORGANISATIONS.

PARA.		PAGE.
66.	Introduction	103
67.	Indian Red Cross Society	103
68.	The St. John Ambulance Association, Indian Council	104
69.	The Bombay Mofussil Maternity, Child Welfare and Health Council	104
70.	The Bombay Presidency Infant Welfare Society	105
71.	The Bombay Presidency Baby and Health Week Association	106
72.	Association for the Prevention of Blindness, Bengal	106
73.	The Bengal Health Welfare Committee	108
74.	The International Health Division of the Rockefeller Foundation in India	109

LIST OF ILLUSTRATIONS.

	FACING PAGE
1. Key map of India showing provinces and districts	1
2. Malaria map of India	15
3. Map showing seaports having international traffic and airports on the main transcontinental air routes in British India and Indian States (1940)	65
4. Graphs showing weekly distribution of cholera cases in certain seaport towns in British India	66
5. Graphs showing weekly distribution of smallpox cases in certain seaport towns in British India	67


KEY
MAP OF INDIA
(SHOWING PROVINCES AND DISTRICTS).
REFERENCE
KASHMIR & JAMMU
AFGHANISTAN
BALUCHISTAN
PUNJAB
RAJPUTANA
SIND
NEPAL
BHUTAN
ASSAM
BIHAR
BENGAL
BURMA
CHANDERNAGORE
DAMAN
BOMBAY
CENTRAL PROVINCES
EASTERN STATES
BAY OF BENGAL
MADRAS
LACCADIVE ISLANDS
PONDICHERRY
KARIKAL
ANDAMAN ISLANDS
CEYLON
REFERENCES
Scale 1 inch = 160 Miles.
Miles 100 120 80 40 0 160 320 480 Miles
Published with the permission of the Secretary Government of India.
HELIOCHROMOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA

Annual Report of the Public Health Commissioner with the Government of India for 1940.

SECTION I.

INTRODUCTION.

1. Last year in order to meet a wide demand that the Public Health Commissioner's report, constituting as it does an annual review of health conditions in India, should be available as early as possible after the close of the calendar year, a preliminary annual report was published in June 1940 for the year 1939. In previous years the Public Health Commissioner's report became available about a year and a half after the year to which it related; this was inevitable as long as it was regarded as necessary to publish full statistical data with the report. The full statistical data for 1939 together with some supplementary information about health conditions in that year were published some months after the preliminary report appeared.

The reception given to the preliminary report by the press, both lay and medical, showed that it met a genuine demand on the part of those who are interested in the progress of health matters in India. Its early publication was made possible by the cordial cooperation of the Provincial Directors of Public Health, who, in spite of their heavy duties, found time to provide the necessary material regarding the health conditions in their provinces during the previous year. The information which has been supplied by the Directors of Public Health for the year 1940 is fuller and has made it possible to prepare this report on a broader basis.

It has therefore been decided that this report published approximately six months after the year to which it relates will for the future be regarded as the regular Report of the Public Health Commissioner. The detailed statistics for Provinces and States will appear later in what will be known as the "Supplement to the Report of the Public Health Commissioner."

The year under review has been a period of wide unsettlement, of suffering and distress in many parts of the world as the result of the war. In India we were spared this agony and the peace that we have enjoyed has protected us to a large extent from that deterioration in health which is inseparable from the privations and physical disabilities attendant on war. The public health of India during 1940 reflected in a large measure the effects of our conditions of security. Apart from the usual local variations in the prevalence of the common epidemic diseases, the year 1940 was unmarked by any abnormal outbreaks of disease. In fact, with regard to the common epidemic diseases such as cholera, smallpox and plague, although final figures have not yet been received, the available information shows that, in many parts of the country their prevalence during 1940 was less than in the previous year.

War conditions create health problems of their own. Owing to the large expansion of aerial communications and the extension of the war to Africa the danger of the introduction of yellow fever into India has been increased

The Government of India have been fully alive to this danger and have taken prompt measures to avert the possibility of such a calamity. The restriction that persons arriving in India by air from yellow fever areas must produce evidence of satisfactory inoculation or, in the alternative, spend the incubation period of the disease in some non-infected area before arriving in India is being strictly enforced. Aircraft arriving from yellow fever areas are compelled to produce a certificate that they have been effectively disinsectised at either Khartoum or Cairo. The scrupulous enforcement of these measures is vital to India's protection against the introduction of this disease which has wrought such havoc in those parts of the world where it has become established.

In India measures have been taken to deal with any possible outbreak of the disease. The health authorities of the Provincial and State Governments have been requested to report promptly to the Public Health Commissioner even suspected cases of the disease. In view of the fact that yellow fever has so far been non-existent in the country and that its diagnosis may, in certain cases, present difficulty, arrangements have been made by the Central Government to place an expert diagnosis unit at the disposal of Provincial and State Governments in the event of any suspected case being discovered.

Detailed instructions have been supplied to the Governments regarding the measures to be adopted in any area in which yellow fever breaks out. One of the most important measures in combating an outbreak is an intensive and efficient control of mosquito breeding in the infected area and, in order to ensure this, an expert unit from the Malaria Institute of India will be placed at the disposal of the Provincial Government concerned. Another important step in India's policy regarding the control of the disease was the decision taken to make preventive inoculation against the disease available in this country. Through the munificent generosity of the Rockefeller Foundation stocks of the vaccine are now held for use in the event of an outbreak.

It is important to remember that, as pointed out by Sir Girja Shankar Bajpai, Member-in-charge of the Department of Education, Health and Lands in the Government of India, at the third meeting of the Central Advisory Board of Health, war, however grim its reality and however imperative its claims, is only a passing phase in the course of history and the maintenance of health activities on the home front must not be neglected. Any serious reduction of the health services during war time should therefore be deprecated and it is gratifying to record that during the year under review, the pressing demands of the war did not interfere with the progress of routine health administration in the country. In the day to day administration in the provinces, in the encouragement of medical research and in the maintenance of such specialised services as those for tuberculosis and leprosy no slackening of effort took place. The annual report of the Tuberculosis Association of India states that " In spite of the fact that the country's interest and energies have been concentrated upon the successful prosecution of the war, the year 1940 has seen a consolidation of the Association's existing activities and of progress in several new directions". Organisations like the Indian Red Cross Society and the Indian Council of the British Empire Leprosy Relief Association carried on their peace time activities without any diminution. In the case of the former, there was in addition a large expansion of activity in connection with the war. It will thus be seen that the home front has not been neglected.

From the point of view of public health policy the most important event of the year was the third meeting of the Central Advisory Board of Health at

Poona in July 1940. This meeting discussed a variety of subjects, which included the reports of two committees, one on the Compulsory Inoculation against Cholera of Pilgrims and the other on the Control of Food Adulteration. Both the reports were approved by the Board and the recommendations of the two committees were commended for adoption by the Provincial and State Governments. The report of the Committee on the Compulsory Inoculation of Pilgrims expressed the desirability of Governments selecting suitable festival centres in their areas for trying out a system of indirect compulsory inoculation of pilgrims against cholera, which had been successfully worked out at the Pandharpur pilgrimage by the Government of Bombay, and of adopting certain measures which the committee proposed for providing the funds and the trained personnel necessary for carrying out mass inoculation.

The Food Adulteration Committee divided the problem of controlling adulteration into three aspects, *viz.*, the technical, legislative and administrative. In the report submitted to the Board only the technical aspect, which concerns itself with the technique of food analysis and the standards of purity to be prescribed for individual articles of food, had been considered. The Board recommended the adoption by Provincial and State Governments of the standards suggested by the committee for different articles of food. An important recommendation of the committee was that a standing committee should be set up, which will be entitled "The Central Committee for Food Standards" and which will act in an advisory capacity on the lines of the Society of Public Analysts in England and the British Standards Institution. The Board authorised its Chairman to appoint this committee and steps have already been taken to bring this about. It is to be hoped that this expert committee consisting as it will of public analysts, health administrators and representatives of dairying, agricultural and trade interests, will be able to guide Provincial and State Governments in the formulation of measures for the control of the purity of food supplies.

The Central Advisory Board of Health also considered the two questions of the teaching of hygiene in schools and of the medical inspection of school children. The subjects are so inter-related and the information available to the Board regarding the existing provisions in the provinces was so inadequate that the Board recommended the consideration of the two questions by a special committee to be appointed by the Chairman.

Among the other subjects discussed by the Board an important one was the proposal that Governments should provide laboratories at suitable centres for the free examination of clinical material from cases of infectious disease, sent either by a medical practitioner or by a Government medical officer. The Board commended for adoption by the Provincial and State Governments a plan for the provision of laboratories which had been set out in a memorandum on the subject submitted to the Board by the Office of the Central Advisory Board of Health. This plan provides for a central laboratory for each Province or State capable of dealing with the highest type of diagnostic work and research, for regional laboratories for groups of districts and for laboratories in individual districts. The memorandum also deals with the questions of personnel and of the distribution of the cost between the Government and local authorities. The desirability of raising the standard of diagnosis by medical men of the suspected cases of infectious disease which they meet in their practice is unquestioned and it is to be hoped that the Governments will now initiate steps to introduce the scheme in some suitable areas in the Provinces and States and gradually expand it over the whole territory as and when funds permit.

The effect of unhygienic and overcrowded housing conditions on the incidence of tuberculosis has long been recognised by health authorities all over the world and town planning, slum clearance and the construction of well ventilated and airy dwellings on such cleared areas have been an important part of the campaign against the disease in all progressive countries. In India, while town planning and slum clearance have been carried out in some of the larger cities by Improvement Trusts, the beneficial effects of these measures have, in many cases, been largely offset by the indiscriminate construction of insanitary buildings on the cleared areas through the failure of local bodies to exercise their powers, under the building byelaws, to regulate house construction. The Board, therefore, strongly urged on all Provincial and State Governments the necessity, in the interests of public health, for the strict enforcement of building byelaws.

The foregoing are some of the important subjects which were dealt with at the third meeting of the Central Advisory Board of Health. The full text of the resolutions passed by the Board will be found at pages 36 to 39 of this report.

SECTION II.

HISTORY OF THE CHIEF DISEASES.

Cholera.

2. Statistical studies on the epidemiology of cholera have been carried out by a number of investigators and it has been shown that a relationship exists between the incidence of the disease and various climatic factors. It has also been suggested that cholera epidemics occur in cycles of some years. All this information is interesting and, under existing conditions, may prove useful to public health workers by affording them some indication of the chance of occurrence of outbreaks. But it must be remembered that cholera and other bowel diseases are dependent for their continued propagation on defective sanitation. Protected water supplies and a sound system of nightsoil disposal will almost completely change the epidemiological features of these diseases.

The provision of protected water supplies and efficient conservancy for the large rural population of the country is the most important factor in the control of cholera and bowel diseases in general. The extent to which progress has been made in the provision of these two elementary requirements in the different provinces, during 1940 has been summarised in the section relating to rural health on page 39 of this report. Briefly stated, the bulk of the rural population lack these two principal factors of environmental hygiene. A few provinces have formulated long term schemes for the provision of protected water supplies in the villages and the selection of places for the installation of water works is being guided by such considerations as the cholera history of the villages and their importance as centres for large gatherings of people in connection with festivals and markets. The conservancy problem has also received some attention in certain provinces. The construction of bore-hole latrines for public and private use has been stimulated and educational propaganda for their more extended utilisation by the people is also being carried out. But the tempo of progress will have to be accelerated to a considerable extent if the requirements of the rural population in regard to water supplies and conservancy are to be met within any reasonable period of time.

In 1940 the incidence of cholera in most provinces was on a smaller scale than during the previous year. Coorg was completely free from the disease, in Ajmer-Merwara, only a single case was reported and Delhi Province had only six cases during the year. The N.-W. F. Province and the Punjab reported only localised outbreaks. Bihar, Bengal, Orissa, Bombay and Madras reported substantial decreases in their cholera incidence in 1940 in comparison with the previous year, while Assam recorded a small decrease. On the other hand, in the Central Provinces and in Sind the incidence of cholera was higher during 1940 than in 1939. Brief notes regarding individual provinces are given in the following paragraphs.

In the N.-W. F. Province a few outbreaks of small proportions took place in Hazara and Kohat districts, nine villages in all being infected with the disease. It is reported that the infection spread from the Punjab where in the neighbouring districts cholera was prevalent. The district travelling motor dispensary proceeded immediately to the affected villages and dealt promptly

with the epidemic. Mass inoculation and disinfection of water supplies were the chief preventive measures adopted for dealing with the disease.

The Director of Public Health, Punjab, points out that the incidence of cholera in the province is largely influenced by the occurrence of the *Kumbh mela* at Hardwar. In 1938 when an outbreak of the disease took place during the festival at Hardwar the number of cholera deaths in the Punjab rose as high as 5,760. In 1939, on the other hand, only 19 deaths from the disease were recorded in the province as a whole. In 1940 the number of deaths from cholera was 189. It is stated that only small localised outbreaks took place and that the highest number of cases that occurred in any single outbreak was 29, Preventive measures were in every case immediately instituted and it is reported that the spread of the disease was effectively checked. The number of anticholera inoculations carried out during the year totalled 274,157. These were mainly carried out in famine areas bordering on infected areas in the United Provinces. The low vitality of the people in these famine areas rendered their protection against cholera particularly necessary in order to prevent the spread of infection.

The rural areas of Delhi Province were completely free from cholera during 1940, four cases with three deaths took place in Delhi city while New Delhi and the Fort Notified Area each had a fatal case. Anticholera inoculations during the year totalled 4,801.

In the United Provinces it is reported that cholera prevailed in an epidemic form over a wide area during the year, the worst affected districts being Gorakhpur, Basti, Benares, Cawnpore, Mirzapur, Ghazipur, Bareilly; in nine other districts localised outbreaks took place. The cholera epidemic reached its height in August and September. Nearly 700,000 anticholera inoculations were given to the population of the affected areas.

The prevalence of cholera in Bihar during 1940 is stated to have been less than during the previous year. The disease first appeared in the districts of Ranchi and Manbhum in January and in March the epidemic began to spread more widely, the peak being reached in the months of August and September. During this period all districts except one are stated to have reported a relatively high incidence of the disease. In October and November the epidemic continued with lessened severity and in December a definite decline was recorded. The district of Champaran suffered most from cholera during the year under review.

It is reported that vigorous preventive measures were taken both by the Government and by the district board health staff in the affected areas and that sufficient quantities of cholera vaccine and choleraphage were placed by the Government at the disposal of the local authorities. Special doctors were also deputed for duty in the infected areas.

The incidence of cholera in Orissa showed a considerable reduction compared with 1939, the number of deaths from the disease being about 4,038 in 1940 as against 11,141 during the previous year. In the first three to four months of the year the epidemic prevailed in the districts of Cuttack, Puri and Balasore. In the Ganjam Plains cholera appeared in February and continued to prevail to the end of December. From the Ganjam Plains the disease spread to the Agency areas of Ganjam and Koraput districts in the latter part of the year but the number of deaths in these areas was relatively small. The other parts of the province were practically free from cholera during the year.

For the control of the disease the Government and local bodies appointed additional temporary staff. The Government supplied 260,900 doses of cholera vaccine and a large quantity of cholera bacteriophage free of cost to the local bodies.

The Director of Public Health, Bengal, states that the incidence of cholera in that province during 1940 was markedly less than during the previous year. Cases of cholera occurred in Burdwan, Birbhum, Bankura, Midnapore, Howrah, Murshidabad, Jessore, Khulna, Dinajpore, Jalpaiguri, Darjeeling, Rangpur, Bogra, Malda, Chittagong and Tippera districts. In the majority of districts the intensity of the epidemic was very much less than that of the previous year. In Khulna district, on the other hand, the disease occurred in a very acute form and its prevalence was more extensive than during any of the previous 15 years. In Tippera district also cholera occurred in a serious form, 775 out of a total of 7,193 villages in the district being affected with the disease, and 2,615 attacks with 1,385 deaths being recorded in these villages. The Public Health Department sent epidemic doctors, sanitary inspectors and combined medical and sanitary units to the affected districts in order to help the local authorities in the carrying out of anticholera inoculations and disinfection of infected and suspected sources of water supply. In the districts of Faridpur, Murshidabad, Jessore and Khulna temporary cholera regulations under the Epidemic Diseases Act were enforced.

There was an increase in the incidence of cholera in the Central Provinces during 1940 compared with the previous year, the number of deaths being 4,974 and 1,661 respectively. Large numbers of cases and deaths were reported from the districts of Nagpur, Wardha, Raipur, Drug, Yeotmal and Akola. The prevalence of the disease was at its height during the months July to November. The distribution of Tomb's essential oil mixture, sterilization of water supplies and inoculation of the population were carried out in all these districts. Temporary cholera regulations were brought into force in the infected areas.

The mortality from cholera in Bombay Presidency showed a substantial fall during 1940 compared with the previous year, only 716 deaths due to this cause being reported as against 1,786 during 1939. The figure for 1940 is the lowest recorded during the past 13 years, and there has been a progressive decline in cholera mortality in the province since 1936.

During the first half of 1940, the incidence of the disease was negligible, only 28 deaths being recorded during this period. With the outbreak of the monsoon there was a small rise in July. December recorded the largest number of deaths, *viz.*, 288. The districts of Sholapur, Ahmednagar, Thana, Poona and Kolaba experienced the highest incidence of cholera mortality. In the remaining districts the disease occurred only in sporadic form. Gujarat was free from cholera except for 18 deaths in Surat district and one death in Ahmedabad district. East and West Khandesh districts usually experience a relatively high incidence of the disease but in 1940 there occurred only four deaths from cholera.

For the curative and preventive campaign against the disease, epidemic medical officers and dispensary medical officers were employed, and in addition temporary medical men were appointed in the affected districts during the cholera season. The Commissioner of the Central Division made a village uplift van available for a propaganda tour in the infected districts of that division.

During the past four years special precautionary measures have been taken at Pandharpur festival by preventing the entry of uninoculated persons to the pilgrim centre during the fair. This measure has had a considerable influence on reducing the spread of cholera infection in the presidency. In 1936, when compulsory inoculation of the pilgrims was first introduced, 50 attacks and 26 deaths were reported during the fair. Since then the public have begun to cooperate more willingly with the authorities in the carrying out of inoculation. It is reported that statistics for the incidence of cholera among the returning pilgrims in 1940 were collected from Bombay Presidency, from the Central Provinces and from Hyderabad State and only two cases were reported. The Director of Public Health states that, since 1936, the spread of cholera from this important fair, which used to play a large part in the dissemination of the disease, has been effectively checked.

The total number of anticholera inoculations during 1940 was 206,000, of which 106,218 were performed at Pandharpur during the festival.

In 1940 there was a considerable increase in the incidence of cholera in Sind, 227 deaths being reported as against three during the previous year. The district most affected was Dadu where 104 cases proved fatal. The disease appeared first in Dadu town in July 1940 and thence spread to Nawabshah and Larkana districts and the city of Karachi.

Among the measures taken to combat the disease were the enforcement of special regulations against cholera, a ban on the export of fish and fruit from the railway stations within the areas declared to be infected, inoculation of the affected population on a large scale, the prohibition of fairs, the appointment of special cholera controlling officers and the opening of segregation camps.

In Madras Presidency the incidence of cholera during 1940 was mild, the disease in epidemic form being confined to the Northern Circars. In the latter half of the year it is reported that cholera spread from Ganjam to the Vizagapatam district in Madras Presidency and to the deltaic areas of East and West Godavari and Kistna districts. Two interesting features of this epidemic are stated to be that the *Ogawa* type of the organism was responsible for the outbreak this year instead of the *Inaba* type as in previous years, and that the incidence of the disease was higher in women than among men, although the fatality rate was smaller among the former.

It is reported that, although cholera broke out in a village of Mysore bordering on Coorg, the receipt of timely information and the institution of prompt preventive measures averted the entry of infection into Coorg.

In Assam the number of deaths from cholera recored in 1940 was 2,811 as against 3,020 in 1939, a decrease of nearly 7 per cent. Most of these deaths occurred in November and December. Of the total deaths nearly 70 per cent took place in Sylhet district, the disease prevailing there throughout the year. In Cachar district there occurred in November an outbreak of the disease among immigrant fishermen who acquired the infection from an endemic area of the district and spread the disease along the villages on the banks of the rivers during their return journey to their homes. In order to prevent the recurrence of such an outbreak it is stated that measures are under consideration for the purpose of regulating boat traffic on the rivers and for inoculating the fishermen. Nowgong district also suffered from a sharp outbreak of the disease in December, the infection being brought in by immigrant agricultural labour from Bengal. The outbreak lasted about six weeks

and there were in all 316 attacks and 152 deaths. Most of these deaths occurred in the first three weeks and; on the institution of preventive measures, the outbreak was rapidly brought under control. The number of anticholera inoculations carried out in 1940 was 335,559, a substantial increase over the figure for the previous year, namely, 106,208.

There was only one case of cholera in Ajmer-Merwara during the year and that took place in September 1940 ; all the contacts were inoculated and the sources of water supply were heavily permanganated.

Plague.

3. In the Preliminary Annual Report for 1939 it was pointed out that a considerable diminution in the incidence of plague had taken place in India within the last decade. This satisfactory position was maintained in 1940 also. The provinces of Baluchistan, Sind, the N.-W. F. Province, Ajmer-Merwara, Delhi, Orissa and Assam reported no cases of the disease. The Punjab and Bengal were also free from infection except for a few imported cases. In Coorg there occurred a few sporadic outbreaks in a number of villages on different occasions. In the United Provinces, Bihar and the Central Provinces the plague epidemic was milder in 1940 compared with the previous year and in Madras Presidency its incidence is stated to have been about the same in both the years. Bombay Presidency alone experienced a relatively extensive epidemic of the disease, the number of deaths from this cause being 5,573 in 1940 as against 1,472 in 1939.

Under the existing conditions in India the most effective methods of control for plague appear to be by the systematic destruction of rats by cyanogas in the affected areas, by the popularisation of ratproof houses of a design suited to the requirements of the rural population and at a cost within their means and by the active immunisation of the inhabitants of the infected or threatened areas. In this connection it may be recalled that mention has been made in previous annual reports, of the extensive tests of the value of cyanogas fumigation for rat destruction which had been carried out in an endemic area for plague, the Cumbum valley in Madura district of Madras Presidency. At its last meeting in December 1940 the Plague Advisory Committee of the Indian Research Fund Association placed on record its approval of the findings of these operations which are embodied in a report on the Cumbum Valley enquiry. The report stated, " Cyanogas fumigation operations systematically carried out in the infected and threatened villages during the last six years, may be said to have been mainly responsible in reducing the endemic plague of this valley to the extent now reached." In his review of the health conditions of Madras Presidency in 1940 the Director of Public Health states that " the major portion of Cumbum valley, which had been a hotbed of endemic plague during the last two decades, has now been totally free from any evidence of infection for over 22 months ". The value of cyanogas fumigation as a plague preventive measure has therefore been fully established and its intensive application in all plague infected areas should be undertaken by the health authorities concerned.

Mention was made in the Preliminary Annual Report for 1939 of a model rural ratproof hut which was constructed in the Cumbum valley. This has

now stood the test of two years and it may now be accepted as a type design for the rural areas, especially as its cost is stated to be only Rs. 75.

The incidence of plague in the provinces and the preventive measures taken against the disease are briefly reviewed below.

The Director of Public Health of the United Provinces states that the epidemic of plague in that province during 1940 was of a mild character. Fifteen districts were affected, the districts with large numbers of deaths being Gorakhpur, Jaunpur, Ballia, Azamgarh, Basti and Benares. The maximum incidence of the disease was in the months of March and April.

The incidence of plague in Bihar was less in 1940 than during the previous year. The districts which suffered most from the disease were Shahabad, Saran, Champaran, Muzaffarpur, Monghyr, Bhagalpur and Santhal Parganas. The districts of Saran and Champaran reported the largest number of cases.

A special feature of the epidemic during 1940 was the absence of an outbreak of plague in Bettiah town during the cold weather. It is stated that this might have been due to the systematic cyanogas operations for deratisation which were started in the town from November 1940. In the earlier part of the year (January to May, 1940) a plague hospital was opened in the town where the treatment of cases with a serum prepared at the Haffkine Institute was carried out under the direction of the Director of that Institute. Of 162 cases admitted into the hospital 55 died and the remaining patients were discharged cured.

During 1940 the disease was prevalent in the Central Provinces in the districts of Nagpur, Chhindwara, Betul, Jubbulpore, Saugor, Mandla, Hoshangabad, Balaghat and Yeotmal. Two hundred and eighty-three deaths were in all recorded as against 852 during 1939. The usual methods of control of the disease, such as inoculation, evacuation, disinfection of infected material and rat destruction, were carried out as far as possible in the affected areas. Cyanogas fumigation of rat holes was adopted in the municipalities of Jubbulpore and Betul.

In Bombay Presidency 1933 was a peak year for plague, the mortality from the disease being as high as 24,560. Since that year a steady decline took place in the incidence of plague during the next five years, the recorded number of deaths from this cause during the period 1936-38 being in the neighbourhood of 500 each year. In 1939 the disease again took an upward turn. In that year the deaths from plague numbered 1,472 while in 1940 the figure rose to about 5,573. Bijapur district bore the brunt of the epidemic, the number of deaths recorded being 2,434. Sholapur, Dharwar and Belgaum districts also experienced fairly extensive epidemics, the numbers of deaths reported being 1,223, 1,202 and 617 respectively.

It is stated that special antiplague measures were organised in these four districts. The affected areas in each district were divided into sectors and mobile units were organised in order to enable the medical officers to visit the infected villages as quickly as possible. Antiplague inoculations were carried out on an extensive scale and the number of inoculations performed totalled 675,000. Cyanogas fumigation and other methods of rat destruction were also carried out, wherever possible. Special facilities for the treatment of plague with the new drug, M & B 693, were provided at Barsi and Indi and it is reported that encouraging results were obtained with this drug.

An enquiry into the causes of the recrudescence of plague in Sholapur and the adjoining districts was started during the year with a view to finding out the endemic foci, if any, and the factors responsible for the spread of the

disease, the Entomologist of the Haffkine Institute being in charge of the enquiry.

The incidence of plague in Madras Presidency during 1940 is reported to have been about the normal level. The districts affected were Bellary, Salem, Coimbatore, Anantapur and Kurnool, the largest number of deaths occurring in Bellary district.

It is reported that sporadic outbreaks of plague took place in a number of villages in Coorg on different occasions. In March 1940 the disease broke out at Somwarpet and five attacks and one death took place in that village. Again in September, four attacks with three deaths occurred in the same place.

In October another outbreak took place in a group of six villages on the frontiers of Mysore State, the infection having been brought from the bordering villages in that State. The number of antiplague inoculations carried out during 1940 was 10,781.

During the last week of September a Plague Conference was held in Bangalore which was attended by the Directors of Public Health of Bombay, Madras, Hyderabad and Mysore States, and Coorg was represented by the Assistant Health Officer. The adoption of preventive measures on a cooperative basis by the different administrations and the introduction of cyanogas fumigation as a plague preventive measure were discussed at this meeting. In Coorg cyanogas fumigation was carried out at Somwarpet, it is reported, with satisfactory results.

Smallpox.

4. In the majority of the provinces the incidence of smallpox is reported to have been less during 1940 than in the previous year. In Madras it is stated to have been about the normal level while in Bombay, Sind, Coorg and in the Central Provinces an increased incidence of smallpox has been reported. Brief reviews of the history of smallpox in the different provinces are given in the following paragraphs.

In the N.-W. F. Province smallpox occurred in an epidemic form in the districts of Peshawar, Hazara, Bannu and Dera Ismail Khan, 920 cases with 374 deaths being reported in all during the year. The Director of Public Health points out that powindahs, who migrate into the province during the cold weather, are responsible for the dissemination of smallpox amongst the inhabitants of the settled areas and that the immunisation of these nomadic people is essential for checking the spread of the disease. The Government have decided that, during the coming winter, a campaign of vaccination should be started among those powindahs who settle down in the province, a warning being issued at the end of the cold weather that next year the Government would insist on the vaccination of all powindahs seeking entry into British India.

In the Punjab the Director of Public Health states that the incidence of smallpox is characterised by a periodicity of approximately five years. In recent years there has been a tendency for the epidemic outbreaks to occur with lessened intensity. For instance, the average annual number of deaths from smallpox for the quinquennial period ending 1940 was 4,089 compared with 4,795 for the corresponding period ending 1935.

It is reported that, during the past five years, some progress has been achieved in vaccinating the people. The average annual number of vaccinations carried out during the period has been between 4½ and 5 millions while the corresponding figure used to be about three millions during previous years. It is stated that the effect of this increased vaccination is seen more in a lowering of the case mortality rate for smallpox than in a reduction of the incidence of the disease. In 1940 the case mortality rate was 31·5 per cent, the lowest figure so far recorded, while in the period prior to the intensive vaccination campaign the rates used to range between 40 and 50 per cent.

Two factors that make any rapid improvement of vaccination difficult are stated to be the fact that every year large numbers of births escape registration with the result that these infants remain unvaccinated, while the notification of cases and deaths from smallpox leaves much to be desired. The Director of Public Health points out that without an improvement being effected in both directions and without the introduction of legislation to make revaccination compulsory no real progress can be achieved in combating the disease.

The incidence of smallpox during 1940 in Delhi Province is stated to have been only a fifth of that during the previous year. There were in all 205 cases with 152 deaths. Of these, however, nearly 67 per cent of the cases took place among children under five years of age.

Smallpox was reported from all the districts in the United Provinces, the worst affected being Gorakhpur, Jaunpur, Bijnor and Basti. The disease reached its highest incidence during the months of June and July while the lowest figure was recorded in October. The eastern half of the province was more affected than the western.

In 1940 it is stated that the incidence of smallpox in Bihar was higher than during the previous year. The disease showed a tendency to increase from the month of February, the peak of the curve of incidence being reached in May. In July the incidence of smallpox began to decrease and the minimum was reached during October and November. The districts of Bhagalpur and Monghyr suffered most from the disease during the year. The Director of Public Health mentions that vaccination and revaccination were carried out vigorously in the affected areas.

The Director of Health and Inspector General of Prisons, Orissa, states that there is usually a five year epidemic cycle of smallpox in the province and that the year 1940 was the peak year of the cycle. The epidemic continued from the previous year and steadily rose to the end of May, after which it slowly declined in the latter part of 1940. The total number of deaths from smallpox recorded during the year was in the neighbourhood of 5,500 as against 3,282 in the previous year. Cuttack district recorded the largest number of these deaths, the figure for 1940 being 3,581 compared with 2,645 in the previous year. Other districts in which the disease occurred in an epidemic form were Balasore, Puri, Sambalpur and Ganjam Plains.

In last year's report it was mentioned that in certain parts of this province primary vaccination is not compulsory. Moreover, in some areas, the people have to pay a sum of two annas for each successful vaccination. A scheme for making vaccination and revaccination free and compulsory throughout the province had been under the consideration of the Government for some time and it is stated that the scheme has now been approved and that it will take effect from April 1941.

Cases of smallpox were reported from 15 districts in Bengal during 1940 but the epidemic is stated to have been of a low intensity in many districts.

A grant of Rs. 49,000 was made by the Provincial Government to District Boards for the enforcement of free vaccination. Smallpox regulations under the Epidemic Diseases Act were brought into operation in the district of Bogra, in the Diamond Harbour Subdivision of the 24-Parganas district, and the municipalities of Naihati and Titagarh.

Smallpox cases were reported from all the districts of the Central Provinces and the number of deaths from the disease in 1940 was as high as 4,607. The corresponding figure for 1939 was 762. The incidence of the disease was high in the districts of Nagpur, Wardha, Khandwa, Hoshangabad and Raipur, the height of the epidemic being reached during the months, March to May.

It is reported that temporary additional vaccinators were appointed in the districts in which the disease spread in an epidemic form, and that temporary smallpox regulations were brought into force in the affected villages in a few districts.

The Bombay Presidency experienced an increased incidence of smallpox during the year under review, the disease occurring in an epidemic form during the first half of the year. Cases were reported from all the districts in the province and a total of 10,525 deaths was recorded as against 3,756 during 1939. The epidemic was severe in the districts of West Khandesh, Nasik, Ahmedabad, East Khandesh, Ahmednagar, Poona, Broach, Satara, Kaira and Sholapur. Bombay city recorded 834 deaths due to smallpox during the year.

It is reported that vaccination and revaccination were vigorously carried out in the affected and threatened areas. A reassuring feature of the situation is the fact that the public have begun to realise the value of vaccination as a protective measure against smallpox. This is evidenced by the fact that six municipalities applied to the Government in 1940 for the enforcement of the Compulsory Vaccination Act in their areas and that the number of municipal towns in which the compulsory Act was in force has risen from 18 in 1934 to 95 in 1940.

The epidemic was at its height from January to May and the largest number of deaths was recorded in April.

The Director of Health Services, Sind, states that the province is almost invariably visited by smallpox and that its incidence is more in the rural than in urban areas. During 1940 smallpox was prevalent in all the districts; its incidence was highest in Hyderabad where 1,253 cases and 432 deaths from this cause took place during the year. Another district which was seriously affected was Thar Parkar, where 1,091 cases with 212 deaths occurred.

The recorded mortality from smallpox in Sind during the first five months varied between 155 and 224 while the number of deaths was under ten during each of the last four months of the year.

It is reported that an intensive campaign of vaccination and revaccination was carried out, additional temporary vaccinators being appointed and extra vaccine lymph being made available to them. Vaccination is now compulsory in all municipal towns. It is stated that efforts are being made to make vaccination compulsory in the rural areas also. As a first step the Notified Area or Sanitary Committees of taluka headquarter towns have been advised to agree to the extension of the provisions of the Bombay District Vaccination Act of 1892 in their areas. Seven out of a total of 37 Sanitary Committees have accepted the provisions of this Act.

The incidence of smallpox in Madras Presidency during 1940 is stated to have been about the normal level, the districts most affected being Coimbatore, Malabar, South Arcot and Vizagapatam while the municipalities of Bezwada, Cochin, Coimbatore and Villupuram also suffered heavily. These districts and municipalities together contributed about 80 per cent of the total incidence of the disease in the province. A vigorous vaccination campaign was carried out in these areas.

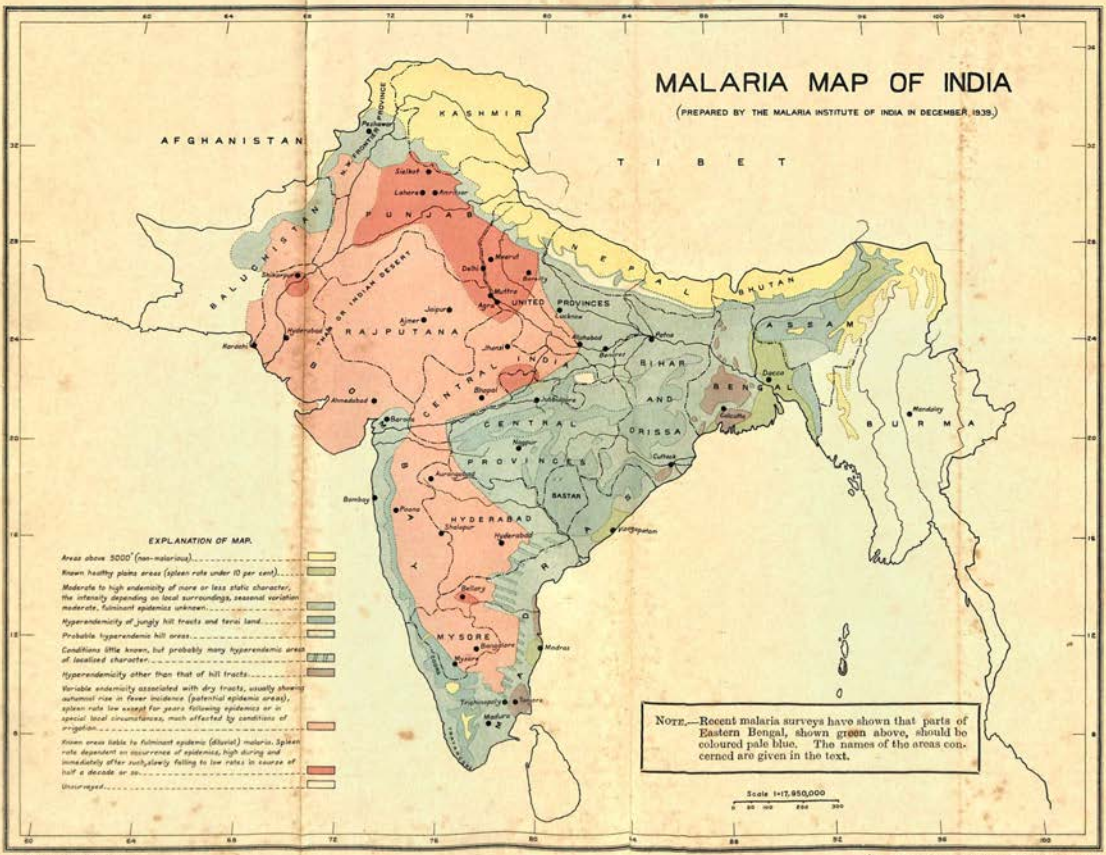
An innovation to which the Director of Public Health draws attention is the cultivation of smallpox vaccine lymph on the embryonic chick membrane and its use in 25 villages in Chingleput district for the purpose of comparing the results with those of glycerine lymph, which is now in common use throughout the presidency.

In Coorg a small outbreak of smallpox with five attacks and two deaths took place in March at Pulikot village. Another outbreak involving 73 attacks and 20 deaths occurred in South Coorg as the result of infection being introduced from Cannanore in Malabar district. It is stated that, owing to anti-vaccination propaganda, there was considerable opposition to vaccination among the people and that the immunity of the population to smallpox had consequently been reduced to some extent. When smallpox developed in epidemic form the Government employed an additional temporary sanitary assistant for three months and a vigorous campaign of vaccination was carried out, the total number of vaccinations performed during the year being 12,590.

The number of deaths from smallpox in Assam during 1940 was 1,403 as against 2,197 in 1939. The Director of Public Health states that, from an examination of the figures for the previous five years, the incidence of smallpox appears to have remained at a high level. Further, of the total deaths from the disease, about 75 to 85 per cent occurred during this period in Sylhet district alone. At no time of the year was the district free from smallpox. It is stated that, while the outbreaks in other districts have a tendency to die down quickly, in Sylhet the decline is very slow. The Director of Public Health therefore considers this district to be an endemic area for smallpox. On the other hand, it is pointed out that the Brahmaputra valley has continued throughout to be free from the disease except for a few localised outbreaks. No information has been given regarding the vaccinal condition of the population of the Brahmaputra valley in comparison with that of the inhabitants of Sylhet, where the disease is stated to be endemic. Other factors have also undoubtedly a bearing on the incidence of the disease, for instance, the liability to the introduction of infection from outside in the two cases, and it would be interesting to know how far the relative freedom of the Brahmaputra valley from smallpox is due to the immunity of the population or to other fortuitous circumstances.

As regards vaccination, the Director of Public Health states that there is yet room for an improvement of the success rate although some rise has been recorded during the past few years, the rates for 1936 and 1939 being 88·1 and 95·5 per cent respectively. The Director points out that difficulties of communication in many parts of the province and the consequent delay in the use of the lymph for vaccination result in the deterioration of its potency and in some of it being wasted.

In Ajmer-Merwara smallpox prevailed in an epidemic form from the beginning of 1940. Additional staff were employed and a record number of vaccinations (65,396) was carried out during the year.



Res. No. 2027 6'40—3,200.

HELIOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA.

In Baluchistan only 26 cases of smallpox were reported during 1940. Most of these cases were imported from neighbouring villages in Iran and Afghanistan.

It is reported that all the contacts were promptly vaccinated and that segregation was enforced in respect of the villages in which outbreaks of the disease took place.

Malaria.

5. The geographical distribution of malaria in India and the preventive measures adopted against the disease, which is undoubtedly the most important public health problem in the country, were briefly described in the Preliminary Annual Report for 1939. The map facing this page gives some indication of the areas in which the disease exists and of the degree of intensity of its prevalence. Since the publication of this map in the Preliminary Annual Report for 1939 in June 1940 it has been brought to notice by the Director of Public Health, Bengal, that recent malaria surveys have shown that parts of Eastern Bengal shown as free from malaria are subject to moderately severe outbreaks of the disease. Such areas are the subdivisions of Mymensingh and Netrokona of Mymensingh district, Manikganj of Dacca district, Bhola and Patuakhali of Bakarganj district, Chittagong of Chittagong district and Comilla and Chandpur of Tippera district.

The problem is of such magnitude that the efforts so far made have not been sufficient to place an effective check on the incidence of the disease over large tracts of the country. At the same time it would be wrong to underestimate the value of the work so far accomplished. In 1940 Sir Malcolm Watson, the Director of the Ross Institute of Tropical Hygiene, London, paid a visit to India and toured the provinces of Madras, Assam, Bengal, Delhi and Bombay and the Indian States of Travancore, Cochin and Hyderabad. While paying particular attention to the antimalaria work carried out in the tea estates in India with which the India Branch of the Ross Institute is specially associated, Sir Malcolm inspected the preventive campaign against the disease in other places also and paid striking testimony to the work carried out in the country during the past ten years. Speaking at the annual general meeting of the Tea Association at Calcutta on 29th March, 1940, he stated, "I can say without hesitation and without a qualification that in the last decade nowhere in the British Empire has such progress been made in the control of malaria as in the tea estates in India; it is a remarkable achievement". He pointed out that, in one group of tea estates with 18,000 people, the improved health conditions gave the employees "over 100,000 days pay more in 1938 than they had ten years ago". Nor has the good work been confined to the tea estates alone. Eleven years previously Sir Malcolm had made certain recommendations for the prevention of malaria in Hyderabad, Deccan, and he noticed that a remarkable change had been brought about in the intervening years. He said, "Not only has the spleen rate of children been reduced to practically zero, but a suburb of the city which was rapidly being abandoned has again become prosperous, and an entirely new suburb is being built in an area

previously regarded as too unhealthy for habitation." Regarding the anti-malaria operations in Delhi Sir Malcolm stated that he was greatly impressed with their efficiency and with the economy with which they had been carried out and that he had no doubt that the happiest results would ensue.

This testimony of such a distinguished malariologist regarding the value of the work in India must indeed prove heartening to those who, in spite of the serious handicaps of slender resources, inadequacy of trained personnel and the wide prevalence of man-made malaria brought about through ignorance and carelessness, have carried on the fight against the disease with a stout heart and with undiminished vigour. What has already been achieved carries with it the hope that, with a wider enlightenment of the people regarding the methods of malaria prevention, the campaign against the disease will produce still more fruitful results in the coming years.

It should be remembered that malaria is largely a rural problem in India and that the people of these areas are so poor that they cannot afford to pay for any costly measures of malaria control. During the past few years different methods of combating the disease have been tried in an intensive manner in certain parts of the rural areas of Delhi Province and a brief reference to these measures will be found in the paragraphs dealing with that province. These measures deserve adoption in other parts of India also.

The campaign against the disease can succeed only by educating the people in the methods of prevention and by securing their active cooperation. Much of the minor sanitary works necessary for eradicating mosquito breeding can be carried out by the people themselves if they are prepared to devote a small part of their leisure to such works. Draining the marshes, clearing the jungle, filling up hollows in which water collects—these are all part of a village improvement scheme to which the villagers themselves should contribute their share of work for the furtherance of the common good. There will then develop, from such cooperative effort, a bond of mutual goodwill and a sense of civic responsibility which are bound to exercise a beneficent influence on the health and well-being of the population. When once the people become convinced that the malaria problem is capable of solution and that its prevention requires the active cooperation of all in the affected areas, public opinion will demand that everything possible shall be done for the attainment of the desired end.

The measures carried out in the different provinces for controlling malaria may now be briefly reviewed.

Dera Ismail Khan and Tank were the only districts in the N.-W. F. Province in which epidemics of malaria took place during the year. In Dera Ismail Khan the epidemic reached its first peak in April and May and there was another and more severe outbreak in September, October and November. In Tank a severe outbreak of malignant malaria took place during the last three months of the year. Special medical staff were employed for the treatment of the disease and for the carrying out of preventive measures in the affected areas.

In the Punjab malaria is reported to have prevailed in a mild epidemic form during 1940 from August onwards. No correct estimate of the actual incidence of the disease can be made, but there are two criteria by which the extent of its prevalence may be assessed to some extent, namely, the number of cases of fever treated at the hospitals and dispensaries in the province and number of deaths recorded under "fevers" in the death register. Judged by the first standard the districts most affected were Hissar, Hoshiar-

pur, Ludhiana, Ferozepur, Gurdaspur, Sialkot, Sheikhupura, Shahpur, Jhelum, Mianwali, Muzaffargarh and Dera Ghazi Khan. The average annual number of registered fever deaths in the province during the five years 1936-40 was 408,833 while the figure recorded in 1940 was 473,649, a difference of about 65,000. This rise in the number of 'fever' deaths is indicative of increased prevalence of malaria during 1940, although the figure is relatively small in comparison with the number of deaths from 'fevers' recorded in a year of severe malaria epidemics such as 1908, when 697,000 deaths were registered under that head.

In order to make quinine readily available to the people, the Public Health Department supplied 685 lbs. of the drug while the district boards and urban local bodies provided 1,000 lbs. of quinine and 110 lbs. of cinchona febrifuge.

No information is available regarding the actual incidence of malaria in Delhi Province but a rise in the number of 'fever' cases from 65,806 in 1939 to 75,824 in 1940 suggests that there was an increased prevalence of malaria during the year under review. Climatic factors were in 1940 more favourable for the spread of the disease than during the previous two or three years. Of the total annual rainfall of 21·7 inches in 1940, as much as 17·2 inches fell within a period of 30 days during July-August. The consequent rise in relative humidity in August was favourable to the prolongation of the life of the mosquito and therefore for the completion of the cycle of development of the malaria parasite in that insect. In 1939, on the other hand, the monsoon started in June and only 7·8 inches of rain fell during the corresponding period in July and August.

As regards the Delhi urban area, where antimalaria operations have been in progress during the past few years, the Director of the Malaria Institute states that "there was some local transmission of the disease along the riverain margin of the urban area at various points from Timarpur to Daryaganj." Some cases of malaria also took place in New Delhi, in the Electric Power House quarters, the Reformatory School, among the children of the District Jail staff and in a labourers camp situated between Purana Kila and Humayun's tomb. In Subzimandi to the west of Delhi city, in the area cultivated by the Western Jumna Canal tail distributary, there occurred a few cases but the outbreak was not serious probably owing to the oil booms installed in the canal and its tributaries. Cases were also reported from the villages of Nizamuddin and Jangpura.

An examination of the spleen rates shows, however, that in 1940 the incidence of malaria must have been definitely less than in 1936, a year of normal rainfall. In three localities, namely, Wazirabad Pumping Station, the Electric Power House and Jumna village the rates were relatively high in 1940 but, in comparison with 1936, they were definitely lower. The following figures are reproduced from the report of the Director of the Malaria Institute of India incorporated in the Chief Health Officer's 1940 report for Delhi Province.

Spleen rate.

	1936	1940	
	July.	June.	November.
Wazirabad Pumping Station	88	7	30
Electric Power House	90	6	30
Jumna village	68	9	27

The Director of the Malaria Institute states that, except in these few places, there was little evidence of transmission of malaria. In New Delhi the percentage of children with enlarged spleens in 1940 was only 0·6, which is stated to be less than the average figure recorded in places where malaria is absent.

In connection with the antimalaria operations in Delhi urban areas engineering works of a permanent nature had been sanctioned to the extent of about Rs. 27 lakhs. Owing to certain improvements effected in the carrying out of these works, it was possible to make a saving of about Rs. 10 lakhs in the estimated total expenditure. During the official year 1940-41 a sum of Rs. 5,29,550 had been sanctioned on engineering works and by the end of the financial year all the works were expected to be completed. The programme of permanent works will then have been completed except for one item, the Western Jumna Canal scheme, which, though sanctioned in 1936, has been held up owing to certain administrative difficulties.

In addition to these permanent antimalaria works recurring measures, such as the application of larvicides and levelling and draining operations were carried out throughout the year under the direction of the Assistant Director of the Malaria Institute of India.

The Director of the Malaria Institute of India sums up the experience of antimalaria operations in the rural areas of Delhi Province during the previous three years by stating that the policy to be adopted should be one of (*a*) distribution of quinine by the health staff, (*b*) spraying of adult mosquitoes in houses, with a gradual transference of the responsibility for the measure to the people themselves and (*c*) antilarval measures mostly carried out by the villagers through the formation of "Malaria guards" under the supervision of the Public Health Department.

In regard to quinine distribution he emphasises the necessity of daily visits by the distributing staff to each affected village in order to ensure that all patients suffering from fever receive their dose of quinine. He states that the scheme has been shown to cost about two annas and eight pies per head of the population for the period, 15th July to 15th December, and he considers that the figure can be further reduced.

Spraying of adult mosquitoes was carried out by boys from each village who were engaged for the task at two annas per day and the cost of the scheme, excluding supervision charges, per head of the population was Rs. 0-2-8 for the malaria season. Spraying was carried out in each house once a week. It is pointed out that many of the villages have purchased their own spray pumps and antimosquito solution, a fact which gives an indication of the growing popularity of the measures for mosquito control.

Antilarval measures constitute the most costly item in the programme, minor engineering works, such as filling, levelling and draining operations, and the application of larvicides together costing Rs. 0-10-5 per head of the population. The only way in which economies can be effected will be by stimulating the people to undertake for themselves all the earth work necessary for these operations. Supervision by trained staff and the cost of larvicide will continue to remain as a major charge in respect of antilarval measures but local initiative should provide the labour required free of charge.

The antimalaria operations in the rural areas of Delhi Province fall under three heads: (1) those relating to the villages in a three mile belt around the Delhi urban area, (2) the measures carried out in Najafgarh thana and (3) the operation in the rest of the province.

In the three mile belt a sum of about Rs. 37,500 was made available during the financial year 1940-41 for permanent works in connection with the drainage of certain *nullahs*. In addition recurring measures, such as distribution of quinine, spraying of mosquitoes in houses and antilarval operations were also carried out on lines indicated above.

In Najafgarh thana, quinine distribution was done by the health staff from the middle of July to the middle of December, antilarval measures were carried out around every village in the thana and spraying of mosquitoes in the homes was carried out by the people themselves.

In the remaining villages of the province distribution of quinine was carried out by the establishment of quinine centres at convenient villages as well as by individual members of the health staff. Antilarval measures were carried out only in limited areas around each village and spraying of adult mosquitoes was done by the people. It is stated that the popularity of spraying is evidenced by the fact that the villagers purchased for themselves 348 sprayers and an equal number of bottles of the solution. The Director of the Malaria Institute also speaks of the high value of the services rendered by the " Malaria guards " in many villages. The work was carried out by these guards, in each case, under the supervision of the Public Health Department.

Malaria was reported in an epidemic form from ten districts of the United Provinces, the highest incidence of the disease being in the months of August and September. It is stated that in most districts the epidemic was relatively mild and restricted to certain localities. About 251 lbs. of quinine and cinchona febrifuge were distributed free, and 682 lbs. of tablets were sold. Dispensaries and hospitals were supplied with 3,338 lbs. of quinine powder on payment.

Malaria surveys and investigations of specific local malaria problems were carried out in a number of towns and districts. Mention was made in the 1939 Preliminary Report of an intensive malaria investigation that has been in progress since 1938 in certain villages in the Hardoi district and in the Terai and Naini Tal districts, in collaboration with the Indian Research Fund Association. These researches continued during the year.

The Director of Public Health, Bihar, reports that during 1940 malaria was prevalent in all the districts of the province, its incidence being particularly high in the districts of North Bihar. In these districts there are many rivers which flow from the foothills of the Himalayas and discharge themselves into the Ganges. The areas covered by these rivers have suffered from epidemics of malaria ever since the earthquake of 1934. However, it is reported that, by the wide distribution of quinine and the institution of antimosquito measures in some of the heavily infected areas, the prevalence of the disease has been controlled to some extent. During 1940 special centres for the treatment of malaria were opened in 48 places in the districts of Champaran, Muzaffarpur, Darbhanga, Purnea, North Bhagalpur and North Monghyr and it is reported that about 757,000 patients were treated at these centres. The incidence of the disease is stated to have been at its maximum from October to December and during the months of March and April.

Measures for mosquito control were carried out, as in previous years, in some of the worst affected areas. These measures included as usual the removal of weeds and recanalisation of dead rivers and filling and oiling operations. In certain areas it is stated that the spraying of houses for the killing of adult mosquitoes was also carried out. Financial aid was given by the Government to the local authorities towards these antilarval measures.

and quinine was supplied free. Four units for malaria surveys were posted in each of the districts of Muzaffarpur, Darbhanga, North Bhagalpur and Purnea and their investigations are stated to be in progress. In Ranchi district three centres for antimalaria measures had been working for the past few years at Kuru, Palkot and Kolebira. A new centre was started in 1940 at Jonha. Further, 13 treatment centres for malaria were opened in different parts of the district. The Government gave a free supply of quinine and a grant of Rs. 2,000 to the District Board for carrying out antimalaria operations. Government aid was given to many other local bodies also.

The Director of Health and Inspector General of Prisons, Orissa, states that during 1940 the province was comparatively free from malaria. The areas in which the disease is usually widely prevalent in the province are the deltaic portions of Cuttack, Puri and Balasore districts, the area round the Chilka lake in Ganjam Plains and the Agency Tracts of Ganjam and Koraput.

Antimalaria operations were carried out, it is reported, throughout the year in a number of centres in the district of Koraput. At Lakshmannath in the district of Balasore, the District Board carried out antimalarial measures with a grant of Rs. 800 sanctioned by the Government. In Kendrapara municipality similar measures were instituted by the local authority and the Government gave a grant of Rs. 1,300. It is reported that, in both the places, these measures reduced the incidence of malaria. The Government are stated to be considering the grant of another Rs. 500 to the Kendrapara municipality for the continuance of antimalarial work during 1941-42.

In Puri a severe outbreak of malaria took place during the last quarter of the year and an antimalaria scheme prepared by the Assistant Director of Public Health and the Civil Surgeon, Puri, was put into operation and continued till the end of February 1941. Antimalarial measures were also adopted to some extent in the municipalities of Cuttack and Berhampur. A field unit from the Malaria Institute of India investigated the causes of malaria incidence in the area surrounding the Chilka lake and it is stated that useful epidemiological information has been collected.

In order to popularise the use of quinine in the rural areas a sum of Rs. 4,700 was provided by the Government for the purchase and sale of quinine through post offices and other vendors. Quinine was distributed free in the hospitals and dispensaries of the province and a further quantity of 35 lbs. of quinine was distributed among the people during the year from the reserve stock of the Public Health Department. In order to build up a reserve of quinine for the province, the Government decided to purchase annually for four years an additional quantity of quinine besides the usual amount purchased each year. In 1940, 400 lbs. of quinine were purchased as the first instalment of this reserve stock.

It is stated that malaria prevailed in an epidemic form in many parts of Bengal during 1940. Severe outbreaks of the disease took place in the districts of Jessore, Khulna, Rajshahi, Bogra, Pabna, Malda, Mymensingh and Faridpur.

The Government of Bengal sanctioned a sum of Rs. 5 lakhs for the distribution of quinine and cinchona products during 1940. Of this, a sum of Rs. 168,750 was distributed among the district boards for the free issue of quinine through hospitals and dispensaries maintained or aided by them, and an equal amount was spent for the distribution of the drug through agencies other than hospitals and dispensaries. The civil surgeons of the province were given a total grant of Rs. 56,250 for the free issue of quinine

from those hospitals and dispensaries under them which were not aided or maintained by district boards and a similar amount was made available to the district magistrates for quinine distribution through agencies other than hospitals. The remaining sum of Rs. 50,000 was kept at the disposal of the Director of Public Health for the purpose of making special grants of quinine and cinchona products to district boards, municipalities and charitable dispensaries in order to combat malaria in those areas where the disease was particularly widely prevalent.

Malaria surveys were carried out in a number of places including the municipal areas of Nator, Faridpur and old Malda and some villages in the districts of Khulna, Midnapore and Mymensingh.

The Central Provinces recorded 265,265 cases of malaria during 1940. Free distribution of quinine amounting to 730 lbs. was carried out by Sub-assistant Health Officers and officials of the Revenue Department in the affected areas. Antimalaria surveys were carried out in the towns of Jubbulpore and Khandwa and the civil station area of Nagpur.

The number of deaths recorded as having been due to malaria during 1940 in Bombay Presidency was 29,602 as against 28,833 in 1939. The districts with a high incidence of the disease were Nasik, Poona, East and West Khandesh, Thana, Belgaum, Dharwar and Kanara. Special medical officers were appointed for visiting the malarial areas and for treating the patients.

During 1940-41, the Government sanctioned a grant of Rs. 69,900 for free distribution of quinine and for the sale of quinine through post offices and the expenditure actually incurred exceeded this amount by about Rs. 35,000. This is stated to be largely due to the heavy demands for the supply of the drug from all parts of the province. Free distribution of quinine was carried out through the agencies of school boards, Assistant Directors of Public Health and the Collectors of districts.

The Director of Health Services, Sind, reports that malaria is one of the major health problems of this province and that the number of deaths from the disease increased from 1,553 in 1939 to 2,106 in 1940. The deaths from fevers also showed a large increase from 23,964 in 1939 to 29,206 in the year under review. It is therefore likely that the actual incidence of malaria was higher than that indicated by the deaths recorded under that cause.

The Government provided a sum of Rs. 44,000 for the free distribution of quinine and for the sale of quinine tablets to the public at cheap rates. The agencies employed for such distribution of the drug were the Public Health and Revenue Departments, school boards, philanthropic voluntary societies and zamindars employing largenumbers of labourers. Touring medical officers were appointed on antimalarial duty in the rural areas, especially for visiting those parts of the province where medical aid was not easily available to the people. In addition the medical officers of two travelling motor dispensaries, which toured the villages for giving medical aid to the population, treated a number of cases of malaria among other diseases.

In the town of Larkana, the Ghar Canal which flows through the town is a vast breeding place for mosquitoes, and with an annual Government grant of Rs. 2,000 antilarval treatment of the canal was carried out. It is reported that, as a result of this measure, a reduction in the mosquito population at the centre of the town and in the immediate neighbourhood of the canal was secured, although a corresponding fall in the incidence of malaria had not so far become evident. The Director of Health Services considers that this might be due to the extensive cultivation of rice around the town and suggests

that rice cultivation should be prohibited at least within a radius of half mile beyond the municipal limits.

Educational propaganda was carried out among the people through the printing and distribution of leaflets and posters illustrating the personal preventive measures to be taken against malaria and the value of quinine in the treatment of the disease.

In Madras Presidency an epidemic of malaria broke out in certain areas of Kurnool, Anantapur and Bellary districts during the last quarter of the year. A severe outbreak of the disease took place in the northwestern part of Chingleput district and the adjoining areas of Chittoor district in December 1940. Free distribution of quinine was carried out in the affected areas of these districts.

Mention was made in last year's report of three investigations for the control of rural malaria which are in progress in this province at Pattukottai (Tanjore district), Ennore (Chingleput district) and Wynaad (Malabar district). It is reported that the incidence of malaria in Ennore has shown a decline as the result of the temporary measures adopted in that area.

A preliminary study of an outbreak of malaria in Siruguppa Agricultural Research Station was made and malaria surveys were carried out in Sidhapuram labour settlement, Diguvametta forest colony and Pulivendla town. A malaria control scheme by larvicidal fish (*Gambusia*) was started in Barua in Vizagapatam district.

In Coorg, on the recommendation of the Director of the Malaria Institute of India, spraying of houses for the destruction of adult mosquitoes was carried out in 24 forest colonies, 12 police centres and three selected villages in the rural areas. It is stated that the results recorded at these places were satisfactory. Two municipalities, three notified areas, four panchayat boards, six antimalaria cooperative societies, one forest area and fourteen selected rural areas carried out antilarval spraying as a control measure against the disease. In Mercara municipality, out of a grant of Rs. 2,000 from the Indian Research Fund Association, automatic flushing syphons were provided during the year for the flushing of the streams in that area in order to destroy mosquito larvae.

The hospitals and dispensaries in Coorg distributed quinine free to the patients and in addition 425 lbs. of cinchona febrifuge and 150 lbs. of quinine sulphate were distributed in the rural areas through the revenue officials. It is reported that the distribution of quinine to the people, antilarval measures and the spraying of adult mosquitoes in houses have resulted in an appreciable decrease in the incidence of malaria in the areas in which these methods of control were adopted and that the splenic indices of children under 12 years also showed a reduction.

It is stated that the managers of certain estates, who tried the spraying of adult mosquitoes in the houses of their labourers, have reported that the health of these people has shown an appreciable improvement.

It is reported that the number of malaria cases in Assam during 1940 was 194,691 as against 189,746 in 1939, an increase of about 4 per cent. Deaths from malaria are recorded in the province only in the towns and the number of such deaths in 1940 was 291 as against 255 in 1939, an increase of about 14 per cent. While the incidence of the disease was thus higher in 1940 than in 1939, the number of quinine treatments sold during 1940 was 5,303 compared with 7,009 in 1939. The sale of quinine decreased to the extent of about 24 per cent and the reason given by the Director of Public Health for this

is the rise in the price of each treatment packet of the drug from two annas to two annas and six pies. During the year under review an attempt was made to introduce semi-permanent antilarval measures, wherever possible, and it is reported that the results have so far been promising. Spraying of adult mosquitoes has also been tried in the campaign against the disease and the results are stated to be encouraging. In one area the experiment was tried during the year of combining general public health work with antimalaria measures. However, owing to the inadequacy of the public health personnel in the rural areas, the scheme did not make much progress.

It is reported that extensive outbreaks of malaria took place in the towns and rural areas of Ajmer-Merwara, the reason being the relatively heavier monsoon rains during 1940 compared with the previous year. Free distribution of quinine was carried out in all the affected areas and in Ajmer municipality antilarval measures were also undertaken, such as the use of paris green and crude oil in many breeding places and the supply of the larvicidal fish, *Gambusia*, to tanks and wells.

During 1940, it is reported that 82,270 cases of malaria were treated in the province of Baluchistan.

The Quetta Cantonment Board maintains a travelling dispensary for the purpose of carrying out antimalarial measures in the villages to the north and west of the Cantonment. During the year 231 lbs. of quinine sulphate and 287 lbs. of cinchona febrifuge were supplied to the hospitals and dispensaries in the province and, in addition to the treatment carried out at these medical institutions, free distribution of quinine on an extensive scale was carried out by district officials, village school masters and vaccinators.

Enteric fever.

6. While lack of facilities for the bacteriological diagnosis of enteric fever even in many large towns and the inadequacy of a trained medical service for the rural population must make the recorded figures for the disease quite incomplete, such information as is available suggests that the infection must be widespread and that many outbreaks must be occurring without their being brought to notice. In this connection a resolution passed by the Central Advisory Board of Health at its third meeting in July 1940 is important. Provincial and State Governments have been asked to provide as far as possible facilities for the laboratory diagnosis of clinical material from cases of infectious disease submitted for examination by private practitioners and Government medical officers. The value of such a service in the preventive campaign against enteric fever has been amply demonstrated recently in Bombay city. In 1938 an epidemic of enteric fever took place in that city and the Government of Bombay placed the services of the Haffkine Institute at the disposal of all medical men in the city for the free examination of clinical material obtained from their patients. This measure evoked a considerable response from the medical profession and a large number of mild cases, which would otherwise have escaped notice, were reported to the health authority. The latter was in consequence enabled to take prompt preventive measures and bring the epidemic under control. The plan approved by the Central

Advisory Board of Health is sufficiently elastic to make it applicable to the different parts of the country with such modifications as local conditions may require. In order to further the control of enteric fever and many other infectious diseases it is to be hoped that a beginning will now be made in the provinces for the provision of a laboratory service which will be available free of cost for the early detection of such diseases.

Brief notes regarding the incidence of enteric fever in the provinces are given below.

In the N.-W. F. Province it is reported that enteric fever was prevalent throughout the year, especially in the large towns. The people of the province are stated to be willing to submit themselves to inoculation. In Peshawar 6,200 school children were immunised against the disease and the Police and the Frontier Constabulary were also inoculated.

Of the 1,738 deaths recorded in 1940 in Delhi Province as having been due to enteric infection, 683 were reported from Delhi city, 72 from New Delhi, one from the Civil Lines and 982 from the rural area. The Chief Health Officer states that, although a bacteriological diagnosis was obtained only in a small number of cases, there is reason to believe that, under existing conditions in the urban and rural areas of the Province, there must be a good deal of infection. A study of the cases in New Delhi has shown, it is stated, that nearly all the cases took place in a population attracted more by the cheapness than by the quality of their food supply.

In Orissa it is stated that, while figures for the incidence of enteric fever in the general population are not available, hospital statistics suggest that the enteric group of infections forms a fair proportion of the cases diagnosed as fevers.

The Director of Public Health, Bengal, states that most of the districts in the province were affected with the disease during 1940. Burdwan district reported the largest number of cases in the rural areas and Howrah municipality in the urban areas.

Enteric fever is reported to have been prevalent in 16 districts of the Central Provinces during 1940. The total number of deaths recorded under this head in the province was 1,221 as against 1,287 during 1939. High figures were reported from the districts of Nagpur, Wardha, Saugor and Yeotmal.

The recorded deaths under enteric fever in Bombay Presidency numbered 6,779 during 1940. Among the affected districts Kolaba reported the largest number of deaths (862), Bombay city had 443 deaths from this cause as against 246 during 1939. The incidence of the disease was nearly evenly distributed through the year, although small increases were recorded in January, April and December.

In Coorg it is stated that sporadic epidemics of enteric fever occurred in a few hamlets and that suitable preventive measures were applied. The total number of antityphoid inoculations performed during 1940 was 1,630.

The Director of Public Health, Assam, states that typhoid fever was prevalent in most towns of the province during 1940. Although notification of the disease is compulsory in municipal areas, it is stated that even cases under the treatment by qualified medical practitioners are not often reported. In most instances outbreaks were discovered by the municipal health staff or the local medical staff. For instance, a severe epidemic in Barpeta was recognised by the medical staff of the local hospital through the observation that an unusual number of cases of fever was being treated in the outpatient

department at a time when malaria was not prevalent. The outbreak was rapidly brought under control by inoculation and other preventive measures It is stated that an improvement of the sanitary condition of the municipalities can alone place a permanent check on the incidence of the disease.

Fifty-two cases of enteric fever are reported to have occurred in Baluchistan during the year under review. The disease did not occur in epidemic form. T. A. B. inoculation was carried out amongst the residents of the affected villages as a preventive measure.

Tuberculosis.

7. In the campaign against diseases such as tuberculosis, the prevalence of which is largely influenced by various social and environmental factors, it is not possible to record any spectacular progress from year to year. But the past three or four years have seen an important advance in the organised effort against the disease in India. The two most important factors in this advance are the wide and generous response from the people of India to the appeal made by Her Excellency the Marchioness of Linlithgow for the King Emperor's Anti-tuberculosis Fund and the establishment of the Tuberculosis Association of India on 23rd February 1939. The contributions to the King Emperor's Fund came from all classes of people in India and there have been signs in the press and among the public of a growing realisation of the menace of the disease and the urgent necessity for checking its spread. The Tuberculosis Association of India and its affiliated branch associations in the Provinces and in many Indian States are the organisations responsible for the administration of the King Emperor's Fund in the fight against the disease. The central organisation has formulated an antituberculosis scheme which is based on the existing conditions of this country. What has been advocated is a scheme of " organised home treatment ".

While an endeavour will be made to provide institutional treatment for a certain proportion of patients, economic and other considerations in India inecessitate that treatment for the vast majority of patients must be provided in their own homes. The scheme of control of tuberculosis by organised home treatment includes the following :—

(*a*) the tuberculosis clinic ;

(*b*) institutional treatment for a certain number of selected cases ;

(*c*) close cooperation between the clinic and private practitioners ;

(*d*) care and after-care committees to work in connection with the clinics and other tuberculosis institutions ; and

(*e*) colonies or settlements for tuberculous ex-patients.

The tuberculosis clinic occupies a central place in the scheme, because it keeps in touch with the homes of the people and, through the examination of the patients and their contacts, discovers active carriers of infection who may be continually helping to spread the disease. The clinic undertakes some measure of treatment and, in close cooperation with private practitioners, it extends its influence to a wider circle of patients and makes available to them up-to-date methods of diagnosis and treatment. Advanced patients

require more specialised treatment than that which a clinic can offer and it has been suggested that, in the vicinity of every large city, a tuberculosis hospital with 100 to 200 beds should be made available. Such hospitals also serve the purpose of providing the necessary facilities for training medical men in modern methods of diagnosing and treating tuberculosis. One of the main tasks of the Care and After-care Committee is that of affording assistance in the economic sphere to the poorer patients and their families. Further, the committee should work in close association with the clinic and the private practitioners. Without the cooperation of the private practitioners it will not be possible to extend widely the various activities of the clinic.

Lastly, tuberculosis colonies are for patients who have partially recovered from their illness. The colonies serve the purpose of providing them with an environment in which they will be able to earn a living with a moderate amount of work which is not detrimental to their health.

While it is recognised that, as has been demonstrated in the West, a rise in the standard of living and an advance in environmental hygiene are powerful factors for controlling the spread of the disease, existing conditions in India hardly hold out the prospect of rapid progress in these directions. The scheme for organised home treatment therefore proposes to attack the problem by reducing the spread of infection through the detection and treatment of the infective patient, and through the education of his family to avoid infection. It will be seen that the scheme involves the coordinated activities of a number of institutions for the care of the patient and the organisation of public effort to supplement medical relief with the provision of comforts essential for the health and well-being of the patient and his family. The Provincial and State Tuberculosis Associations are entrusted with the task of administering their respective shares of the King Emperor's Fund and the earnestness and zeal with which they apply themselves to this task will largely determine the success of the antituberculosis campaign in their areas.

A few more points require mention. A central tuberculosis clinic was opened in New Delhi in November 1940 with the intention of developing it into a model institution. In May 1941 a sanatorium which will provide special teaching facilities was opened at Kasauli by Her Excellency Lady Linlithgow. This institution will provide advanced training to medical men in antituberculosis work. Recently a nine months' diploma course in the subject has been established by the Madras Government. It will thus be seen that two teaching institutions have now been provided, one for Northern India and the other for South India. In addition annual post-graduate courses of one month's duration had been organised for many years past by the King George Thanksgiving (Anti-tuberculosis) Fund before it was incorporated in the Tuberculosis Association of India. This course was continued in 1940 by the Tuberculosis Association of India and was conducted at the All-India Institute of Hygiene and Public Health, Calcutta. Thirty doctors, including two women, from different Provinces, States and Railways attended the course. Lastly, the second Conference of Tuberculosis Workers in India was held in New Delhi in November 1940 and was attended by about 90 delegates from different parts of the country. A special feature of the conference was a discussion of the influence of environmental factors, such as poverty, overcrowding, undernourishment and occupation of insanitary buildings on the incidence of tuberculosis. Thirty-four speakers took part in the discussion and the questions of town planning, slum clearance and failure to enforce building byelaws by local bodies received prominent attention.

The antituberculosis work carried out in the provinces in 1940 is summarised in the following paragraphs.

In the North-West Frontier Province two tuberculosis clinics were opened in 1940, one in Bannu and the other in Peshawar. A doctor was sent for special training in Madras and he is now employed in one of these clinics. The sanatorium at Dadar remained full throughout the year. New buildings are now under construction for the purpose of increasing the accommodation in the institution by 36 beds.

The share of the Punjab from the King Emperor's Fund is approximately Rs.4,14,000. Of this amount 75 per cent is to be distributed among the different districts which contributed towards the Fund. A special subcommittee of the Provincial Association has been examining the schemes submitted by the different districts. So far grants totalling Rs. 13,616 have been sanctioned of which Rs. 1,000 is given to the antituberculosis dispensary at Jullundur, Rs. 9,061 to a sanatorium in Amritsar which was built recently by private munificence, Rs. 2,400 to the District Red Cross Society, Sialkot, for a survey of the school children in the town by tuberculin testing and Rs. 1,155 to the Simla municipality for equipping the newly constructed tuberculosis dispensary in that town. The Provincial Association has also approved of schemes received from the Deputy Commissioners of Ferozepore, Gurgaon and Shahpur for the establishment of clinics.

It has been decided that a tuberculosis survey should be carried out in a typical area of the province. This area would include a number of villages and small towns. The survey is to extend over a period of five years and its estimated cost is nearly Rs. 1¼ lakhs. Of this about Rs. 60,000 will be contributed by the Rockefeller Foundation, about Rs. 41,000 will be provided by the Provincial Association and the balance will be met by the Public Health Department. It is stated that the survey will start shortly.

The Inspector General of Civil Hospitals, the Punjab, and the Principal, King Edward Medical College, Lahore, have under consideration a scheme for the training of doctors and women workers in tuberculosis work.

The United Provinces Tuberculosis Association has approved of a scheme for the antituberculosis campaign in the province. This scheme provides for the establishment of tuberculosis clinics in a few centres for the purpose of demonstrating the possibility of fighting the disease effectively and for giving field training to tuberculosis workers. Lucknow has been adopted as the provincial centre for such a campaign.

In Bihar the treatment of tuberculosis patients is carried out in a certain number of clinics in different parts of the province. A clinic is run in Patna city under an honorary medical officer. Follow up work in the homes is being carried out through male and female health visitors; about 600 cases were treated during the year at the clinic and approximately 3,000 home visits were paid by the health visitors. Other clinics are run in association with Sadar Hospitals in Chapra, Purulia and Muzaffarpur and with the Pilgrim Hospital in Gaya. New clinics were opened at Motihari and Bettiah in Champaran district.

In Orissa it is reported that a provincial tuberculosis clinic at Cuttack is under construction. The Government have agreed to meet the maintenance charges of the institution at an estimated cost of Rs. 10,000 annually and provision has been made for this amount in the budget for 1941-42. It is expected that the central clinic will begin to function from September 1941.

A health visitor is maintained by the Provincial Tuberculosis Association for visiting the homes of patients within the municipal area of Cuttack. In the course of such visits she detected 90 cases of pulmonary tuberculosis in the town of whom 29 died during the year. Although advice and instruction regarding home isolation are being given by the health visitor, lack of facilities for the treatment of tuberculosis cases is stated to have prevented anything substantial being done for the patients.

A considerable amount of propaganda is stated to have been carried out during the year through pamphlets, posters and leaflets which were widely circulated for the purpose of disseminating elementary but useful information regarding the disease. The health staff under the Government and local bodies gave 820 talks on tuberculosis during the year. It is stated that a booklet on the subject with coloured illustrations has been prepared and that it is now being printed both in English and in Oriya. An examination of the cattle maintained in the municipal dairy farms and in the jails of the province has been in progress for the purpose of ascertaining the existence of tuberculosis infection in cattle.

The Director of Public Health, Bengal, states that, as a preliminary step towards the introduction of a comprehensive scheme for the control of the disease, tuberculosis surveys of the population have been in progress since July 1939. Rural, urban and industrial populations have been included in these surveys. It is stated that all the modern diagnostic methods, such as X-ray examination and tuberculin test, are being employed.

A comprehensive scheme for antituberculosis work in the province is stated to be under the consideration of the Government. The scheme includes (1) special training courses for medical and health officers and for home visitors; (2) the establishment of chest clinics in district headquarter hospitals; (3) the organisation of home treatment in urban areas; (4) the establishment of milk kitchens attached to the clinics towards the maintenance of which the Government would make a grant equal to the amount collected and spent locally, subject to a maximum of Rs. 500 per annum for each clinic; and (5) the provision of a tuberculosis hospital in the neighbourhood of Calcutta and of additional beds for the treatment of tuberculosis in the existing hospitals of Calcutta and in district and subdivisional hospitals. The Tuberculosis Association of Bengal receives a grant of Rs. 10,000 per year from the Provincial Government for organising educational propaganda.

A Provincial Tuberculosis Association was formed in the Central Provinces and started work recently. Four tuberculosis clinics were established in 1938 at Nagpur, Jubbulpore, Amraoti and Raipur respectively. It is stated that these continued to work satisfactorily during the year.

In Sind a scheme has been prepared for establishing tuberculosis clinics on modern lines, which will be run in association with the civil hospitals in the headquarters of the four districts, Sukkur, Larkana, Nawabshah and Mirpurkhas. In order to demonstrate the value of these institutions the Provincial Association has undertaken to maintain them with the help of the Government for a period of five years and a sum of Rs. 25,000 has been earmarked for this purpose. It is hoped that, after five years, either the Government or the local bodies concerned will take up the maintenance of these clinics.

As regards Karachi an up-to-date sanatorium is stated to be nearing completion eight miles outside the city. Certain additions and alterations

to the Municipal Tuberculosis Dispensary, which were suggested by the Medical Commissioner of the Tuberculosis Association of India, are being carried out.

Leprosy.

8. In recent years noticeable features of the antileprosy campaign in India have been an increase in the survey work carried out in different parts of the country and, at the same time, a modification of the methods of survey. In the past emphasis was laid mainly on sample surveys for securing an estimate of the rate of incidence of the disease in the community under investigation. However a mere enumeration of the lepers does not provide sufficient material on which to found an antileprosy campaign. The prevailing type of the disease and the proportion of infected children to the total number of lepers discovered are now recognised as being essential data for assessing the position of leprosy as a public health problem in a particular area. In the opinion of our experts if the proportion of the more severe form of the disease, the lepromatous type, is high and if persons under 15 years form an appreciable percentage of the number of lepers in an area then leprosy must be considered a serious problem in that area. For that reason the tendency now is to carry out surveys on a detailed basis. The Indian Council of the British Empire Leprosy Relief Association has carried out such surveys of the total population of certain selected areas and similar work has also been done by some local authorities. In view of the importance of carrying out such investigations on a uniform basis in different parts of the country the Scientific Advisory Board of the Indian Research Fund Association has appointed a committee to draw up a memorandum which will act as a guide for the conduct of leprosy surveys.

The results of the surveys already carried out on these modified lines show that considerable variations exist in different parts of the country in regard to the type and extent of the disease. The following figures are quoted from the report of the Indian Council of the British Empire Leprosy Relief Association for 1940.

Area.	Population examined.	Percentage of the population infected with leprosy.	Percentage of lepromatous cases.	Percentage of cases below 15 years.
1. Santalpur (Bengal) . . .	3,600	7·4	4	17
2. Bankura (Bengal) . . .	10,011	4·4	18	26
3. Saidapet (Madras) . . .	2,040	6·7	25	49
4. Madras (Rural area) . .	2,007	4·3	25	36

Less accurate reports are available regarding certain other areas of India. A few recent figures are given here :—

Kangra district (Punjab)	0·1	57	12
Jodhpur	0·1	43	5
Assam	1·8	9	11

The rates of incidence of leprosy in the population vary widely in these areas. What is even more important the percentages of (*a*) those with the lepromatous type of the disease and (*b*) infected children also vary widely. In Assam leprosy is relatively of small importance as a public health problem while in the two areas in Madras Presidency the incidence and severity of the disease are both high. The two localities in Bengal occupy an intermediate place while in Kangra district and Jodhpur, although the incidence of leprosy is low, the proportion of severe cases is high.

The main features of the antileprosy campaign in India were briefly described in last year's report. Provincial Governments have begun to take an increasing interest in the leprosy problem, particularly in those provinces in which the incidence of the disease is high. The most important voluntary organisations for antileprosy work are the Indian Council of the British Empire Leprosy Relief Association, with its provincial branches, and the Mission to Lepers. The former has taken an active part in the organisation of laboratory and field research, the provision of outpatient treatment centres, the training of doctors in antileprosy work and educational propaganda. The Mission to Lepers has built up a chain of leper homes all over the country during the past 66 years and, during 1939, the number of patients treated as inpatients in these institutions was 8,213 and as outpatients 6,096. In addition over 800 healthy children were cared for separately from the patients.

A welcome feature of the development of antileprosy work in India has been the growing co-operation between governmental and voluntary agencies. On the central and provincial committees of the British Empire Leprosy Relief Association the health administrations of the respective governments are well represented and this should help towards the elimination of any wasteful overlapping of effort.

While the magnitude of the problem in the areas in which leprosy is widely prevalent makes difficult any rapid advance in the control of the disease, and while further field studies and laboratory research are essential for the elucidation of various problems, a matter of pressing importance today is the utilisation of the existing knowledge on as wide a scale as possible. The most important preventive measures are provision for the isolation of infectious cases and the protection of children from exposure to infection. The incidence of leprosy is mainly amongst the rural population and it is to the rural areas where the disease is endemic that our attention should firstly be directed. Although isolation of the infectious patient is perhaps the most important measure in the campaign against the disease, no costly scheme of segregation can be considered in view of the poverty of the rural population.

A hopeful line of advance is the development of farm colonies. Land suitable for cultivation should be made available by the Provincial Government and only a very simple type of accommodation need be attempted. Agriculture and cottage industries are suitable occupations for leprosy patients and in order to organise such activities, the Agricultural and Co-operative Departments of the Provincial Government should give the necessary help. A certain amount of physical exercise is beneficial to the patient and graduated work will not alone improve his health but will distract him from the sad contemplation of his affliction which so frequently characterises the leper's mental outlook. A treatment centre must be provided in the colony and the local dispensary doctor, who must be trained in the diagnosis and treatment of the disease, should pay his regular visits in order to carry out treatment.

The difficulties in the way of successfully developing such an organisation are recognised. Differences in religion and modes of life make the development of community life by no means easy in a group of people drawn from different areas into a new home. Two or three consecutive years of deficient rainfall may so upset agricultural operations as to seriously jeopardise the economic stability of the colony. This is what happened in a farm colony which was set up a few years ago at Mangaltarai in the Central Provinces under the auspices of the Mission to Lepers. Another serious difficulty is that, since the giving of alms to lepers is considered a religious duty by millions of Hindus and as a lucrative business is being carried on by leper beggars in some of the larger cities of India and in places of pilgrimage, the life on the farm may prove less attractive than the beggar's profession in large centres of population. It is recognised that all these difficulties exist, but the only way in which the problem of segregating infectious cases in the rural population can be solved is by providing an alternative mode of life under conditions in which opportunities for work and for supporting themselves are made available to these patients. The provision of medical care is an added attraction to them for settling in the farm colony.

In the following paragraphs the antileprosy work carried out in the provinces during 1940 has been briefly reviewed.

Leprosy is stated to be a problem of little importance in the North-West Frontier Province. There is a leprosy centre at the Lady Reading Hospital, Peshawar, where 28 outpatients and 11 inpatients were treated for leprosy. Again in the Civil Hospital at Chitral 15 outpatients and four inpatients were treated. At other medical institutions of the province a total of 23 leprosy patients was treated.

A survey of the incidence of leprosy has been in progress in the Punjab since 1931 and the survey was continued during 1940 in the districts of Jullundur and Ferozepur. A population of 949,035 was covered by the surveys in 1940 and the number of lepers discovered was only 60. This is in conformity with the findings of previous surveys which show that the incidence of leprosy in the Punjab is small.

The Provincial Leprosy Officer carried out the lepromin test on 270 persons belonging to different age groups in an area of the province which has been known to be free from disease. This investigation was done in collaboration with the officer-in-charge of the Leprosy Research Department, School of Tropical Medicine, Calcutta. The tentative conclusions drawn from this study are stated to be that children and adolescents are particularly susceptible to leprosy and that the susceptibility decreases with advancing age.

In the United Provinces a special leprosy officer is maintained by the provincial branch of the British Empire Leprosy Relief Association and he works under the direction of the Director of Public Health. His work during the year was confined to the district of Bahraich, where he carried out treatment of leprosy cases and propaganda by means of lectures and demonstrations. Skin clinics are maintained in Benares, Cawnpore and Lucknow and in these a certain number of cases of leprosy is also treated every year.

In Bihar leprosy is widely prevalent. There are nine leper asylums and a large number of outpatient clinics. The asylums are administered by Missions or by local committees and the Government gives grants to these institutions on the basis of Rs. 3-8-0 per patient per month. These grants totalled Rs. 91,370 during 1940.

A Provincial Antituberculosis and Leprosy Officer was appointed by Government during the year. He works under the Inspector-General of Civil Hospitals. Intensive serveys have been carried out in different parts of the province. It is reported that these surveys covered, by October 1940, a population of 157,000 persons in 554 villages and that among them 2,607 cases of leprosy were discovered. In Dhanbad subdivision out of a population of 20,000 in 86 villages, 14,000 were examined and 162 cases were detected. Government sanctioned Rs. 3,900 for a leprosy survey in Santhal Parganas. The investigation started in October 1940 and was continuing at the end of the year.

In Orissa a provincial leprosy officer is maintained by the Government and six district leprosy officers and 16 leprosy assistants are maintained by the provincial branch of the British Empire Leprosy Relief Association. The number of leprosy treatment centres is stated to have risen from 115 in 1939 to 153 in 1940. It is reported that these centres are being used not only for the treatment of patients but also for intensive survey and propaganda within a radius of five miles of each clinic. Through the organisation of village leprosy relief committees, survey work in each village is linked with such preventive measures as are possible under the existing rural conditions. It is stated that sample surveys have been carried out in 53 new centres during the year under report. A new leper colony was established in 1940 at Junani district of Sambalpur. An isolation colony had been opened in 1939 at Lathi in the district of Ganjam. It is stated that the opening of other isolation centres has been planned.

The total number of doctors so far trained in the province in antileprosy work is 24.

Leprosy is prevalent extensively in certain districts of Bengal. These districts are Rangpur, Midnapore, Murshidabad, Birbhum, Nadia, Rajshahi, Bankura, Dinajpur, Dacca, Hooghly, Mymensingh and Burdwan. A comprehensive scheme for dealing with leprosy in the province has been prepared by the Director of Public Health and it is stated that this scheme is under the consideration of the Government. The scheme provides, among other measures, for special courses of training in leprosy for medical and health officers and for the establishment of leprosy clinics in Sadar, Subdivisional and Union Board hospitals. The Director of Public Health states that a beginning will be made for the inauguration of the antileprosy campaign by the carrying out of these two provisions of the scheme.

The Bengal Branch of the British Empire Leprosy Relief Association carried out sample surveys in 22 different areas of the province, the number of persons examined being 41,000. Among them 528 cases of leprosy were discovered. An examination of 86 schools showed that, among 10,000 pupils examined, there were 36 cases of leprosy. The number of leprosy clinics which functioned in Bengal in 1940 was 134.

During the year an important event was the opening of a Leper Hospital and Settlement at Asansol by the Asansol Leprosy Relief Association. Three District Leprosy Relief Councils were organised during the year for Murshidabad, Bankura and 24-Parganas districts.

The incidence of leprosy is stated to be relatively higher in the eastern and southern parts of the Central Provinces than in the remaining areas. In this province there exist several inpatient leprosy institutions which are mostly run by Missions with grants from the Government. These provide accommodation for 1,500 patients. On the other hand outpatient treatment, survey and propaganda are being carried out by the Public Health Department, a

contribution from the provincial branch of the British Empire Leprosy Relief Association being made to meet a part of the cost of this work. The number of leprosy treatment centres is stated to have risen from 41 in 1939 to 44 in 1940. Some of these centres are run by the doctors in charge of local dispensaries, but most of them are staffed by Subassistant Health Officers of the Public Health Department. In this province there are separate Subassistant Health Officers for leprosy duty and for general epidemic duty in each tehsil. The Director of Public Health reports that a scheme has recently been introduced whereby the Subassistant Health Officers on epidemic duty are also required to pay special attention to leprosy. In order to equip these officers for antileprosy work Government have issued orders that they should be given training in leprosy. Twelve epidemic Subassistant Health Officers and eight leprosy Subassistant Health Officers were given a special refresher course in leprosy during April 1940.

The Government issued orders for the establishment of district leprosy councils in Nagpur, Amraoti, Chanda, Yeotmal, Buldana and Wardha districts and also gave a grant of Rs. 600 to these district leprosy councils.

In Bombay Presidency leprosy is stated to be more prevalent in certain eastern districts than in other parts of the province. The Bombay branch of the British Empire Leprosy Relief Association maintained 45 leprosy clinics during the year. In addition 92 treatment centres were maintained in Government dispensaries during 1940 as against 70 in 1939. The numbers of new and old cases treated at the Government centres were 1,201 and 540 respectively. The clinics under the Association treated 5,199 cases during the year.

A special leprosy officer is maintained by the Government. He visited ten districts and carried out propaganda. It is stated that he has been asked to take up survey work, a few villages in each taluk being surveyed in detail.

In Madras Presidency the Government have agreed that the provincial branch of the British Empire Leprosy Relief Association should act as an advisory body to Government and that it should direct all leprosy investigations. In pursuance of this order of the Government the headquarters of the antileprosy campaign have been transferred to the Lady Willingdon Leprosy Sanatorium at Chingleput. The programme of activities include post-graduate training courses for medical men, investigations into urban and rural leprosy, a study of the problem of segregation in relation to leprosy in childhood under rural conditions and epidemiological studies by detailed surveys in the rural areas around four towns, Vellore, Madura, Cuddalore and Wandiwash.

Since 1937 the courses at the Chingleput Leprosy Sanatorium have given training to 75 medical men and 58 health officers. The urban investigation unit has been established at the Government hospital, Royapuram, in Madras city and a detailed survey of the area has been carried out. With this preliminary study an investigation of the methods of control of leprosy under urban conditions is to be started in 1941. In two villages it is stated that, with the co-operation of local authorities and influential persons 'experimentation in practical but simple rural segregation is proceeding'.

In Salem a segregation sanatorium and treatment centre for boys from selected villages is being developed in connection with a proposed Children's Home for the purpose of studying the problems of segregation in relation to leprosy in children.

The epidemiological studies in the areas surrounding the four towns mentioned above are expected to throw light on the factors influencing the spread of leprosy. In the Wandiwash area the incidence rate of leprosy is 26·6 per

cent and the child rate and open case rate are both 40 per cent. These figures indicate a serious position and the investigation of methods of control has been taken up.

Kala-azar.

9. The incidence of kala-azar is mainly confined to north-eastern India, namely, the provinces of Bihar, Bengal and Assam. The Directors of Public Health of the United and Central Provinces have also drawn attention to the occurrence of some cases in certain parts of their provinces. Brief notes regarding the incidence of kala-azar in these provinces are given below.

The Director of Public Health, Bihar, reports that the incidence of kala-azar, like that of malaria, was high during 1939 and 1940 in the districts of North Bihar. Twenty special centres for the treatment of the disease have been working since 1939 in the districts of Purnea, Darbhanga, North Bhagalpur and Muzaffarpur and these continued to function throughout 1940. Each of these centres had two or three subcentres and these were shifted from time to time according to changes in the relative prevalence of the epidemic. Kala-azar patients were also treated at the treatment centres for malaria and at district board dispensaries. The kala-azar centres are stated to have been maintained entirely at the expense of the Government. The numbers of kala-azar cases treated at the centres in the four districts are given below.

	Number of cases treated.
Muzaffarpur	6,081
Darbhanga	14,335
Purnea	7,888
North Bhagalpur	4,891

In Bengal the prevalence of kala-azar is reported to have been high in the districts of Faridpur, Noakhali, Malda, Rangpur and Mymensingh during 1940. Grants totalling Rs. 75,000 were distributed among the differrent district boards and the Central Antimalaria Co-operative Society, Calcutta, for the maintenance of kala-azar treatment centres. Special drugs for treating kala-azar patients were also distributed among the local bodies for a sum of Rs. 28,000.

In Darjeeling district, the special treatment scheme which had been in operation previously, continued during 1940 and a sum of Rs. 17,000 was spent. Twenty treatment centres and three subcentres worked during the year and 1,969 new cases of kala-azar received treatment, of whom 1,598 are reported to have been cured.

The Director of Public Health, Assam, states that the main steps against the disease in that province consist of systematic surveys, detection and treatment of cases of the disease. During 1940 the number of cases treated was 21,376 as against 17,756 in 1939. Thus there was in 1940 an increase of 20 per cent in the number of patients treated. The Director considers that the increase over the province as a whole is probably due to the intensive surveys

carried out and the greater supervision exercised over bringing patients under treatment and that it does not indicate an increase in the incidence of the disease. In fact he is inclined to think that there may have been a diminution of infection in the province. As an instance he gives figures for Sibsagar district in which, although many intensive surveys were carried out during the year, only 644 cases were detected in 1940 as against 1,358 in the previous year.

Whatever the real state of affairs may be, it is gratifying to record that the methods of treatment that are in use have reduced the rate of mortality from the disease to the very small proportion of two per cent. The Director believes that, with further improvements in technique, it may be possible to reduce the death rate further. A disquieting feature of the situation is that the incidence rate has not so far shown a corresponding decline. Until more light is thrown on the transmitting agent for the disease the organisation of a preventive campaign cannot be placed on a scientific basis.

In the United Provinces it is reported that, during the year, the incidence of kala-azar showed an increase in the districts of Gorakhpur and Benares. Three treatment clinics were started in the former and two in Benares municipality in 1940.

The Director of Public Health, the Central Provinces, states that 12 deaths were reported during the year as having been due to kala-azar as compared with ten in the previous year. The districts reporting these cases were Wardha, Chhindwara, Saugor, Bilaspur, Amraoti and Yeotmal.

Cerebrospinal fever.

10. Cerebrospinal fever is reported to have occurred in sporadic form in many provinces. Eighteen districts in the Punjab reported the occurrence of this disease during 1940. There were in all 95 attacks and 35 deaths in the province. The districts of Lahore, Amritsar and Hissar reported 22, 17 and 17 cases respectively during the year. In the other districts the number of cases was less than ten. In the United Provinces the infection was mostly confined to the towns of Saharanpur, Meerut, Agra, Bareilly, Farrukhabad, Benares, Mirzapur, Ghazipur and Lucknow. The rural areas of the districts of Shahjahanpur, Fatehpur and Gonda also reported cases. In Bengal it is stated that during 1940 thirteen districts reported cases of cerebrospinal fever. Of these the Asansol Mining Settlement recorded the largest number of cases, namely 13 and 24-Parganas and Darjeeling districts nine and six respectively. The number of registered deaths from this disease in the Central Provinces is stated to have been 26 in 1940 as against 35 during the previous year. Nine deaths were reported from Nagpur city and the remaining deaths took place in nine districts of the province. Bombay city recorded 33 deaths from this cause during the year and Ahmedabad 10. In the province as a whole there occurred 64 deaths from cerebrospinal fever. Seventeen cases and ten deaths from this disease were reported from Sind in 1940 as against nine cases and seven deaths during the previous year. Except for 16 attacks and 12 deaths and five attacks and three deaths from this cause in Manipur and in the Khasi and Jaintia Hills respectively, the province of Assam was free from infection in 1940. Six cases of the disease were reported from Baluchistan during the year.

SECTION III.

HEALTH ACTIVITIES OF THE CENTRAL AND PROVINCIAL PUBLIC HEALTH DEPARTMENTS.

Introduction.

11. As has already been pointed out in Section I of this report the year under review has been one of activity on the usual lines of progress, unhampered to any noticeable extent by the interruptions caused by the war in many other parts of the world. As has been shown in the annual reports of the Public Health Commissioner for the past few years, two welcome features of the health situation in India have been, firstly, the growing recognition on the part of Provincial Governments of the necessity for increased attention to the health of the rural population and, secondly, the development of cooperation through the Central Advisory Board of Health among the Governments of British India and the Indian States. Although budgetary vicissitudes arising from the war may temporarily impede progress, there is every reason to believe that the demand for better living conditions will become more articulate as years go by and that this demand will provide the stimulus for the betterment of the health of the nation. The Central Advisory Board of Health held its third meeting on the 22nd, 23rd and 24th July 1940, at Poona. In his opening remarks at the third meeting of the Central Advisory Board of Health held in Poona the Hon. Sir Girja Shankar Bajpai, K.B.E., C.I.E., I.C.S., Member in charge, Department of Education, Health and Lands, Government of India, and Chairman of the conference, referred to the fact that while the members' thoughts and energies were naturally centred on the war, the mere fact that the Board was meeting was proof of the confidence in the Empire's final victory and proof also of the members' determination not to neglect the home front.

As has already been indicated in the first section of this report, important health problems such as those of food adulteration, inoculation of pilgrims against cholera, provision of laboratory facilities for private medical practitioners and Government doctors for the diagnosis of infectious disease, health education of school children and of the public were discussed at the meeting. The Board after very full discussions adopted a number of resolutions and these resolutions, which are given below, indicate the scope and variety of the problems discussed at the meeting :

Report of the Committee on the Compulsory Inoculation of Pilgrims :—

(*a*) The Central Advisory Board of Health, in adopting the report of the Special Committee appointed to examine the possibility of introducing a system of compulsory inoculation of pilgrims against cholera, expressed its thanks to the Committee for the able manner in which it has carried out its task. The Board commends the report to all Provincial and State Governments for their detailed consideration.

(*b*) The Board considers that public opinion in favour of anticholera inoculation has grown rapidly in recent years and that the question of introducing compulsory inoculation of pilgrims before they are allowed to enter a festival area can now be considered by Provincial and State Governments without apprehension regarding any possible effects on the minds of the people.

(c) The Board recommends that Provincial and State Governments should study the Pandharpur scheme of indirect compulsory inoculation and that they should for a start select suitable festival centres for trying out this scheme.

(d) The Board wishes to bring to the special notice of all Provincial and State Governments the recommendation of the Committee that, to ensure the success of a compulsory inoculation campaign, a vaccine made from the true strains of the cholera organism should be used.

(e) To meet the cost of health measures including inoculation carried out at the festival centre, the Board considers the imposition of taxes not alone on pilgrims but also on vehicles and animals entering a festival area as being eminently reasonable, and emphasises that these taxes should not be credited to the general funds of the local body or of the Government which may collect them but should be used strictly for the benefit of the pilgrims. They should be administered by the Pilgrim Committee and not by the local body.

(f) For the organisation of an effective campaign of mass inoculation of pilgrims before they set out on their pilgrimage, the Board commends the following suggestions of the Committee :

(i) the utilisation of the services of specially trained sanitary inspectors for carrying out inoculation under the supervision of qualified medical men ;

(ii) the free supply of anticholera vaccine by Government to local bodies ; and

(iii) the use of inoculation certificates of an official nature and of a design quickly recognisable by the inspecting authorities. These certificates should only be issued by medical officers employed by the Government or by local bodies.

(g) The Board recommends for the consideration of Provincial and State Governments the legal aspect of the question of compulsory inoculation described on pages 11, 12 and 13 of the Committee's report and recommends that the question should be examined in order to see whether the existing powers are sufficient or whether it is necessary to acquire fresh powers.

(h) The Board considers that health authorities in the Provinces and States, in consultation with railway administrations, should endeavour to devise methods for the conditional issue of tickets to pilgrims, assuming that to reduce work at railway stations as much inoculation as is possible is carried out by public health organisations in the villages and *en route* to the rail-head.

Report of the Food Adulteration Committee :—

(a) The Central Advisory Board of Health wishes to record its appreciation of the valuable report on the technical aspect of the food adulteration problem submitted by its Committee on Food Adulteration and considers that the recommendations in the report are an important contribution to the solution of the complex question associated with this subject.

(b) The Board endorses the opinion of the Committee on Food Adulteration that the improvement of methods of food analysis and the prevention of food adulteration in India will have to be a continuous process. The establishment of co-ordination between the Provinces is a matter second to none in urgency and with this object in view the Board supports the recommendation for the appointment of a Standing Committee entitled " The Central Committee for Food Standards " which will act in an advisory capacity on the lines of the Society of Public Analysts in England and the British Standards Institution.

(c) The Board recommends that immediate steps should be taken by the Chairman of the Board to nominate such a body on the lines recommended by the Food Adulteration Committee.

(d) The Board recommends that the Central Committee should take up, as early as possible, the consideration of various questions referred to it by the Food Adulteration Committee.

(e) The Board commends to Provincial and State Governments the various recommendations made by the Food Adulteration Committee in regard to definitions and standards and considers that their early adoption will help towards the removal of the restrictions which now prevent the free flow of interprovincial trade, particularly in respect of certain important articles of food.

(f) The Board expresses the hope that the Food Adulteration Committee will complete its further enquiries at an early date.

The effects of the new prohibition policy on the health of the inhabitants in the prohibition areas :—

The Board, having considered the reports received from certain Provinces on the effects of the new prohibition policy on the health of the inhabitants in the prohibition areas, considers that it is difficult on the material collected so far to draw any definite conclusions as to the effect of prohibition on the health of the people. The Board considers it desirable that further information should be collected by the Provinces concerned and suggests to Provinces that the information be collected on lines to be indicated by the Secretary to the Central Advisory Board of Health after consultation with the Provinces concerned.

Results of investigations into the prevalence of fluorosis :—

The Board has read with interest the results of investigations into the prevalence of fluorosis in certain Provinces. In regard to Madras it suggests :

(*a*) the desirability of taking steps to improve the nutrition of the people in the affected areas ; and

(*b*) the carrying out of further research into the problem of cheap methods of removing fluorides in drinking water supplies under rural conditions.

With regard to the Punjab, the Board draws attention to the desirability of field investigations regarding the prevalence of endemic fluorosis in those areas where the drinking water supplies contain a large proportion of fluorides. This study might also take into consideration the diet of the people of the affected areas and its bearing on the incidence of the disease.

It is recommended that other Provinces in which fluorosis constitutes a health problem should pursue investigations on similar lines.

Establishment of laboratories at suitable centres for the free examination of clinical material, from cases of infectious disease, sent either by a medical practitioner or by a Government medical officer :—

The Board considers that the provision of a free laboratory service to medical practitioners for the detection of infectious disease is desirable in the interests of the public health. With this end in view the Board commends for the consideration of Provincial and State Governments the suggestions contained in the memorandum on this subject submitted by the office of the Central Advisory Board of Health, subject to such alterations as local conditions may require.

Teaching of hygiene in schools and medical inspection of school children :—

The Board, having considered the memoranda submitted by the Governments of the Punjab and Madras and by the Educational Commissioner with the Government of India on "The teaching of hygiene in schools " and on "Medical inspection of children in schools", considers that the two subjects are closely related. Systematic attention to the health of children is an essential preliminary to any really remunerative system of instruction, whether it be in hygiene or other subjects in the curriculum. Where the physical condition of the child is unsatisfactory the money spent on educating him is largely wasted. The foregoing involves regular medical examination of school children, the treatment of illness and physical defects and the provision for undernourished children of such food as may be necessary to raise them to an average physical standard. Teaching is not likely to be a success if the general school environment does not conform to reasonable hygienic standards. Information is necessary as to what extent these requirements are met in the different provinces and how best existing defects may be remedied at the least possible cost.

The Board therefore recommends that the Chairman should appoint a special committee to report on the dual question of the teaching of hygiene in schools, primary as well as secondary, rural as well as urban, and of the medical inspection of school children and their treatment and, in the primary stage, also their nutrition.

The effect of bad housing and overcrowding on tuberculosis.

The Board commends for the consideration of Provincial and State Governments the memoranda submitted by the Tuberculosis Association of India and the office of the Central Advisory Board of Health on the effect of bad housing and overcrowding on tuberculosis. Unsatisfactory housing conditions and overcrowding tend to produce an increased incidence of tuberculosis while the transference of tubercular patients from unhealthy to healthy dwellings produces an improvement in their symptoms and the physical signs of the disease. Improvement of housing requires the clearing of insanitary and congested areas in towns and cities and the exercise of rigorous control over the hygienic standards applied to the new housing scheme on the cleared slum areas.

The failure on the part of local bodies, in many parts of this country, to enforce bye-laws relating to health matters has been a subject of constant reference in public health reports for a number of years. While the rectification of defects in an existing slum area may be difficult, there can be no excuse when, after costly slum clearance operations by Improvement Trusts and other bodies, the cleared areas are permitted to be built over without due regard to the requirements of light, ventilation and sound hygienic construction. The Board, therefore, strongly urges upon all Provincial and State Governments the necessity, in the interests of public health, of strict enforcement of building byelaws.

Public health publicity :—

(*a*) The Board commends for the consideration of Provincial and State Governments the memorandum submitted by the Government of Madras on "Public health publicity". While routine health administration if efficiently carried out constitutes in itself an effective means of educating the people in health matters, the absence of such administration in many parts of India makes it still more necessary for Governments to utilise the various methods of health propaganda described in the memorandum for the education of the individual.

(*b*) The Board recommends that Provincial and State Governments should take steps to encourage and develop the education of the people in health matters by means of well directed and carefully prepared propaganda material of all kinds, where satisfactory arrangements for the purpose do not already exist.

Reports on opium addiction and its control in Assam :—

The Board has read with interest the reports submitted by the Government of Assam and by the Director of the School of Tropical Medicine, Calcutta, on the scheme for prohibition of opium in the Sibsagar and Dibrugarh subdivisions, Assam, and recommends that copies of the reports should be circulated to all Provincial and State Governments.

Hospitalisation and treatment of plague cases :—

The Board notes the memorandum submitted by the Government of Madras containing a scheme on the hospitalisation and treatment of plague cases and commends it to all Provincial and State Governments for their earnest consideration.

These resolutions have been forwarded to the Provincial and State Governments. They lay down sound principles for regulating policy in regard to numerous public health problems. At their next meeting the Board will review the action taken by the various Governments on these resolutions.

Rural health.

12. Among the important developments in rural public health activities in India during recent years have been studies in the organisation of a rural health service through the formation of "Health units", improvement of water supplies and attempts to develop a satisfactory system of nightsoil disposal.

Health units.

The area chosen for a health unit usually has a population of 40,000 and the annual budgetary provision is about Rs. 30,000. The staff should consist of one medical officer of health, an assistant medical officer who should preferably be a woman, four sanitary inspectors, four health visitors, eight midwives, one clerk and the necessary menials. The health units established in the different provinces have not always had the full complement of staff suggested above. Moreover, in certain places there has been considerable difficulty regarding the recruitment of health visitors and midwives in the rural areas. It cannot therefore be said that the health unit system has functioned in this country with maximum efficiency. Nevertheless, as will be seen from the following short notes on the activities of the different health units, these organisations have served a useful purpose by stimulating intensive health work in local areas, by evoking popular support for health measures and by providing opportunities for the training of personnel for rural health work. As stated already the annual cost of a health unit is in the neighbourhood of Rs. 30,000 and it is therefore clearly impossible to cover the country with this type of organisation. However, the importance of maintaining one or two fully developed health units in each province must be emphasised. The unit will form the centre for training health personnel and for providing refresher courses for such workers. Apart from these advantages, the trained staff of the health unit with their intimate contact with the rural population are in a position to undertake investigations into various rural health problems.

During 1940 health units worked in the provinces of Madras, Bombay, Delhi, Bengal and the United Provinces. The Poonamallee health unit in the Madras Presidency completed its fifth year of co-operation with the Rockefeller Foundation on 30th September 1940. Under the arrangements between the Foundation and the Provincial Government the annual grant from the Foundation ceased from that date and the Government decided to continue the unit on a modified scale. It is stated that the unit made marked progress in maternity and child welfare work, the midwives attending 60 per cent of the total births in the area. One hundred and twenty students of the Madras Medical College took a course of practical training in the health unit area and 177 subsidised medical practitioners also underwent training there.

It is stated that the Sirur health unit in Bombay Presidency had not secured its full staff of health visitors by the end of the year. The medical officer of health, a health visitor and a sanitary inspector attached to the health unit were sent to Ceylon for training in this type of rural health work. Ceylon has been particularly successful in this class of health work. A woman doctor has been employed and it is stated that she will also be sent for training to Ceylon and Mysore. The unit has not yet developed its work to a sufficiently high level to provide suitable training for public health personnel.

The work of the health unit staff in Delhi has been considerably facilitated by the development of roads in the rural area and they can now move about from village to village more quickly and comfortably. An interesting development has been the utilisation of the services of the medical officer of health for giving instruction in the Government training school for teachers which is located at Najafgarh. This health instruction for teachers should be developed on a wider scale throughout the country as it is probably the most effective way of eventually improving the health education of the children.

The Singur health unit in Bengal is stated to have developed its work in a satisfactory way. During the year the students for the D. P. H. course in the All-India Institute of Hygiene and Public Health, Calcutta, spent two weeks in the health unit area studying the methods of rural health administration. The unit was also visited by the students of Sir John Anderson Health School, Calcutta, by officers of the rural reconstruction camp at Singur and by agricultural officers.

The Partabgarh health unit in the United Provinces has been run by the provincial authorities since 1938 in which year the participation of the Rockefeller Foundation ceased. One of the main activities of this unit has been the organisation of health leagues.

Dr. W. P. Jacocks, Regional Director in India and Ceylon of the International Health Division of the Rockefeller Foundation, has given an excellent account of the work done by health leagues. He states " The entire village population constitutes the league membership, and at meetings any member of the village community is free to offer suggestions or to discuss proposals. The usual procedure is to form a small committee consisting of a chairman, a secretary and three or more members of the village. This committee meets monthly and records its deliberations in a minutes book. A member of the health unit staff attends the meetings by invitation and gives the committee the benefit of his technical knowledge. As a result, at one of the early gatherings a programme is prepared containing various items of work to be attempted and the order in which they are to be taken up. These details include clean-up days by sweeping and by removing the cattle to the borders of the village, vaccination against smallpox and other diseases, putting ventilators and windows in homes, digging bored hole soakage pits and bored hole latrines, collecting vital statistics, and attending to other similar village needs ". With regard to Partabgarh Dr. Jacocks goes on to say that " it would be possible to visit any village in which a league exists and to learn that everyone, young and old, had been vaccinated against smallpox, that all homes were ventilated, that each home had a bored hole soakage pit and bored hole latrine, and that all occurrences of births and deaths had been accurately recorded. In respect to environmental sanitation and inoculation the league has improved matters beyond all recognition. The reason for its success is due no doubt to the utilisation of the *panchayat* principle which is universally understood in India and is clearly appreciated by all village bodies. It is probable that the development of the health league idea is the most important contribution to general sanitation which the health unit system has yet made to the cause of public health."

Rural water supplies.

As regards rural water supplies the information given in the reports of the Provincial Directors of Public Health regarding the developments during 1940 is briefly summarised below :—

In the North-West Frontier Province a scheme has been inaugurated by the Government for providing wells in the dry areas. It is stated that, in a short number of years, these areas will be provided with adequate drinking water.

In the Punjab it is stated that water supply schemes in large villages were completed at a total cost of Rs. 1,94,589 and that works costing Rs. 70,456 were in progress. In addition district boards were given grants by the Government for rural water supply schemes, and in 1940-41 these totalled Rs. 1,24,319.

In the United Provinces improvements to existing wells were made in many villages and new wells with hand pumps were provided in other villages. No information has however been given with respect to the expenditure incurred on these works.

It is stated that, in the Purnea district of Bihar, the water supply problem was acute in 1940. During the year 345 tube wells and 190 other wells were provided in different parts of this district. Forty wells were also provided in different villages in Manbhum district.

In the coastal areas of Orissa tanks usually form the source of water supply. The Director of Health and Inspector General of Prisons states that the district boards have been instructed to conserve certain tanks for drinking purposes only and to have these tanks well protected by high embankments to prevent contamination by men and animals.

It is stated that in Bengal a comprehensive scheme for rural water supply was inaugurated in 1938. A special committee for each *thana* prepares a priority list of villages for the application of the scheme for improving the water supply, the main considerations for their selection being the prevalence of cholera and shortage of drinking water. In order to encourage self-help it has been decided that the villages from which the inhabitants promise a substantial contribution either in money or in labour should be given preference. In the selection of sites for water works the District Engineer and District Health Officer are consulted. Committees for each subdivision in the district and a district committee have been formed in order that the requirements of the district as a whole may be considered in the distribution of the available funds. The selection of the agency for the construction of the works vests in the District Magistrate, while technical supervision of the works is entrusted to the District Engineer and his staff. The health staff have been given powers of supervision and of reporting defects to the District Engineer. The grant sanctioned by the Government is based on three considerations, *viz.*, the area, population and the average expenditure by the district board concerned from its own funds on water supplies during the previous three years. The administration of the funds is in the hands of the Commissioner of the Division and of the District Magistrate. The tube well type of water supply has been adopted as a general rule. However, special local requirements can be met by other types of water supply.

In the Central Provinces the Government sanctioned during the year the construction of 62 wells and two tanks in rural areas costing Rs. 43,149. The construction of 57 wells which had been sanctioned in 1939 was completed in 1940.

In the budget for 1940-41 the Government of Bombay included Rs. 8,50,000 for village water supply schemes. The execution of the works was left in the hands of the local bodies concerned and the amount was not fully utilised. The Government have decided that, in order to expedite the execution of such works, some of the schemes should be carried out by the Public Works Department and others by the District Rural Development Boards.

The water supply scheme sanctioned in 1940 by the Board of Public Health in Sind included the provision of a rapid filtration plant for Hyderabad and improvements to the water supply distribution in Karachi and Sukkur municipalities. It is stated that work on these schemes was in progress during the year. In regard to a number of other municipalities water supply schemes are under investigation.

RURAL CONSERVANCY.

The problem of rural conservancy presents many difficulties. The disposal of nightsoil by manual removal is unsatisfactory even under the best conditions. Moreover, it requires the employment of a permanent staff which most rural areas cannot afford to maintain. Under the circumstances the provision of bored hole latrines, which are cheap to construct and which cost practically nothing to maintain, has been considered by different provincial health authorities as the most suitable method of meeting the situation. An important question in this connection is that of the possibility of contamination of water supplies, particularly in areas where the level of the subsoil water is high. This possibility cannot be excluded until local investigations determine the range of extension of contamination through the soil. Certain experiments were carried out at Lahore during the year in this connection by Mr. Dyer who is a member of the staff of the Rockefeller Foundation. It was found that fœcal pollution did not travel beyond ten feet from the source in that type of soil. Similar studies were started in the Singur health unit area in Bengal but they had not yet been completed by the end of the year. The necessity for such studies need not of course be emphasised. Such investigations should precede the introduction of bored hole latrines in any area on a large scale. If the soil is suitable this type of latrine appears to offer the cheapest and most efficient system of nightsoil disposal for the rural areas.

Famine relief.

13. The majority of the population in India are dependent on agriculture for their living and their economic condition is therefore largely influenced by rainfall. Failure of the crops and resultant famine occur periodically in particular areas as a result of continued deficiency of rain for one or more years, or of floods arising from abnormally heavy rainfall. In the past famine relief has consisted of providing work for the people of the affected areas and of paying them wages with which to purchase food. The physiological aspects of nutrition were not recognised and no provision was made to ensure that, under the conditions of physical strain that accompany famine, the nutrition of the people was kept up at a sufficiently high level to ward off disease. The advantage of active cooperation between the health authorities and the officials carrying out relief measures has been fully demonstrated during the past few years in the famine stricken areas of the Hissar district in the Punjab and in Ajmer-Merwara.

In Hissar a survey of the diet and state of nutrition of 90 families was carried out in February 1939. It was shown that, although the calorie value of the diet was satisfactory, serious defects from the point of view of quality were present. Animal fat was practically absent and milk was hardly consumed by the people. There was also a total absence of green vegetables in the diet. The state of nutrition of 279 workers and 144 non-workers was assessed and it was shown that, of the former, 82 per cent were physically subnormal and, of the latter, 50 per cent. Six per cent of these persons suffered from night-blindness, 25 per cent had a dry, roughened condition of the skin and 65 per cent showed smokiness of the sclera of the eye, which are all signs

of vitamin A deficiency. One per cent of these people showed signs of active rickets and six per cent of old standing rickets, thus indicating deficiency of vitamin D. During the next winter, when the physiological needs of the population became greater, the health of the people deteriorated still more and definite cases of scurvy made their appearance.

In order to meet the situation it was decided that all preventive and curative work should be carried out in a coordinated manner in the areas concerned. The measures taken were (*i*) reduction of the task of workers to the extent of 50 per cent, (*ii*) the location of new works in such places as would reduce the distance that the labourers had to walk, (*iii*) the division of the whole area into 50 health circles, each consisting of villages within a radius of five miles and the organisation of special treatment centres with a medical officer in charge of each circle and (*iv*) distribution of germinated grain and *amla* (the Indian gooseberry) to make up food deficiencies. The results of these preventive measures are shown in the following figures quoted from the " Report on Health Conditions and Public Health Measures in the famine areas of Hissar district, Punjab " by the Director of Public Health.

Morbidity in Hissar district—December 1939 to November 1940.

Month.	Total sick admitted to hospitals and dispensaries.	Cases of scurvy admitted (new cases).	Cases of night blindness attending (new cases).
December 1939	523	67	1,412
January 1940	696	80	746
February ,,	421	60	1,282
March ,,	452	9	1,167
April ,,	446	*Nil*	883
May ,,	354	*Nil*	895
June ,,	332	*Nil*	1,007
July ,,	341	2	1,510
August ,,	381	2	1,450
September ,,	427	53	1,000
October ,,	404	48	661
November ,,	423	21	419

In order to assess the value of these figures it should be mentioned that the period during which the special measures were continuously employed was from December 1939 to the end of May 1940. In June 1940 a reduction was made in the issue of germinated grain and in July, August and September the relief works and dispensaries were closed and the issue of germinated grain was gradually stopped. During October and the greater part of November relief measures and administration of germinated grain were in abeyance. The measures were then reintroduced and the scheme covered about 70 per cent of the population.

It will be seen from the above table that, in December 1939 and January 1940, the numbers of cases of scurvy were 67 and 80 respectively. The administration of *amla* was introduced in January and that of germinated grain in the first week of February. The numbers of cases of scurvy for February and March were 60 and 9 respectively and during the next three months no cases of this disease were reported. The withdrawal of the preventive measures during the succeeding months was accompanied by an increase in the incidence of scurvy. After the reapplication of the preventive measures to a

large proportion of the affected population in December 1940 scurvy again disappeared and no cases were reported in January and February 1941. These facts demonstrate the marked sensitiveness of a population living under famine conditions to alterations in the quality of their food supply. The Director of Public Health, Punjab, points out that the cost of these measures is only 1/10th of an anna per head per week. It is remarkable that the health of the population in a famine stricken area can be protected at such a small cost. The work done in Hissar is therefore bound to have a profound effect on famine relief operations in the future.

In Ajmer-Merwara, owing to the failure of the monsoon in 1938 and 39, there occurred a widespread famine. In August 1939 relief works were first opened and by the end of January 1940 over 200,000 persons or nearly two-fifths of the population in the province had to be given relief.

A special Famine Medical Officer was appointed and his activities included the supervision of all health measures at the different famine relief camps at which medical establishments were provided for the treatment of patients. Accommodation for patients was provided in a number of camps so that the seriously ill and injured cases could be observed and treated. In certain camps nurse-midwives were also provided for the purpose of giving special attention to women and children.

In order to prevent the occurrence of food deficiency diseases the distribution of sprouted Bengal gram to the people was carried out. In all except three camps, where the people objected to taking sprouted gram on the sentimental ground that they were destroying life, the labour population accepted and consumed it. It is stated that no case of scurvy took place among the famine stricken population. This and the fact that the growth and general health of children did not appear to have suffered to any great extent are stated by the Famine Medical Officer to be evidence of the value of sprouted gram for the prevention of deficiency diseases.

From the experience of the health organisation in the two areas certain valuable suggestions have emerged for the improvement of famine relief operations in the future.

Although from the quantitative point of view the amount of food that may be available in the area may be sufficient, the quality of the food supply appears to have a considerable influence on the health and wellbeing of the population. To meet the probable occurrence of deficiency diseases one of the easiest methods of relief is the distribution of germinated grain. Grain is available everywhere and the procedure for germination is simple. As has been shown by the work in Hissar the cost involved is small.

A reduction in the physical strain on the people in a famine area can be brought about either by reducing the number of hours of work or by decreasing the distance that the labourers have to walk to the site of work or by a combination of these measures. The strain of famine conditions should not be accentuated by unnecessary physical exertion.

Another important point to consider is that of conserving the available food supplies in a famine area. It is pointed out by the Director of Public Health, Punjab, that one of the most important things to consider is the care of cows and buffaloes for the maintenance of milk supply in the area. Milk provides the most important source of animal protein in its most assimilable form, particularly for children. He suggests that the supply of fodder by Government should be made conditional on an equitable distribution of the available milk among the village community.

The Famine Medical Officer in Ajmer-Merwara pointed out that the employment of women had a harmful effect on the health of the children. When women came for work they brought their children with them and these children fell ill and, in some cases, died as the result of exposure to the sun. He suggests that men should be given double wages and that the women should be left at home to take care of the children. If this be not possible it is desirable to provide creches near the work so that the women may leave their children in charge of a responsible person who would look after and feed them properly while the women are away at work. He considers that the employment of nurse-midwives to look after the comforts of women and children is essential. The grant of maternity leave just prior to and after confinement is another recommendation.

Lastly, it is desirable that the public works carried out should, as far as possible, be of such a nature as to be of permanent value to the village community. For instance, such measures as improvement of water supply, development of rural communications and planting of trees may, with advantage, be carried out. In a malaria stricken area much of the earthwork associated with antilarval measures can be carried out. The sanitation of the village site is another important direction in which the services of the people can be usefully employed. By directing the energies of the people into such useful channels it may be expected that the improvements effected will leave a lasting impression on their minds and that the development of cooperative effort among the people for the betterment of their own health will be promoted.

The activities of the health departments in individual provinces during 1940 are briefly summarised in the following paragraphs.

North-West Frontier Province.

14. In this province it is reported that the scheme for the medical inspection of school children continued during the year and that the system of giving a midday meal to the pupils was extended to additional schools.

Punjab.

15. Mention was made in the Preliminary Report of the Public Health Commissioner for 1939 that, as an experiment in the coordination of curative and preventive medicine in rural areas, the rural dispensaries in five districts were placed under the control of the Public Health Department. In July 1939 this experiment was extended by the Government to one *tehsil* in each of the remaining 23 districts of the province. Later, the same principle was applied throughout the Hissar district in order to provide for the special needs of that famine stricken area. It is reported that as a consequence of these measures, there were in 1940, 161 rural dispensaries under the control of the Public Health Department. It is stated that this coordination of medical and public health activities has been of benefit to the people. Treatment has

been brought to the homes, the early detection of persons suffering from infectious diseases and the application of preventive measures have been facilitated and the dispensary doctors have been able, it is stated, to make a contribution to the improvement of environmental sanitation in the villages through their contact with the people. The number of visits paid to the villages was 21,000 and over 30,000 patients were treated in their own homes during the year. It is also stated that these touring doctors discovered 379 cases of smallpox, ten cases of cholera, 668 cases of tuberculosis, 1,775 cases of typhoid fever and over 18,000 cases of infectious diseases of other kinds. The Director of Public Health points out that, in spite of these additional activities, the work in the dispensaries did not in any way suffer.

Industrial health has been receiving increasing attention in this province during the past few years. In 1936 only 17 factories were inspected and in 1940 the number rose to 317. Of these 108 were visited more than once. The strength of the inspecting staff was increased during the period by the appointment of one whole-time officer and by designating all district and municipal medical officers of health as part-time inspectors.

The activities for the prevention of food adulteration also increased during the past five years. In 1936 only 45 local bodies were applying the Punjab Pure Food Act. By 1940 the number increased to 160. The number of samples of foodstuffs examined by the Public Health Chemist in 1936 was 209 and in 1940 this number rose to 1,220.

In addition the Public Health Chemist carried out in 1940 the analyses of a large number of samples of ghee in order to ascertain the seasonal and other changes which may occur in the results obtained from the examination of samples of genuine ghee. It has been shown that these results differ with the season of the year and with the feeding of the animals. The question of standards of purity for ghee and for certain other articles of food has been fully discussed in a recent report by a committee appointed by the Central Advisory Board of Health to investigate all aspects of the food adulteration problem in India. The committee state that "more knowledge is required in respect of the characteristics of genuine ghee in different parts of India depending on factors such as breed of animal, method of feeding, seasonal and climatic conditions, etc.". The results of the investigation in the Punjab are in accord with the opinion expressed by the committee. It is therefore essential that, as emphasised by the committee, the values prescribed in the Provincial Food Adulteration Acts for ghee "should not be regarded as arbitrary figures which of themselves decide whether a sample is adulterated" or not, that the figures should only form a guide in reaching a decision regarding the genuineness of the sample and that the results of all the tests should be taken into consideration together.

Another investigation carried out by the Public Health Chemist in this province was that of the fluorine content of samples of water from different places. The number of samples so far examined is 434 and it is stated that, in respect of specific water supplies, no seasonal variations in the fluorine content have been noted.

In last year's Preliminary Report attention was drawn to the remarkable absence of "mottled enamel" and other serious conditions in the population of the areas in the Punjab, in which a high content of fluorine in water was shown to exist and it was pointed out that this was in marked contrast with the experience in Madras Presidency. In Madras laboratory experiments and field studies indicated that a high calcium and low vitamin C content of the

diet of the people was associated with the development of fluorosis, and it was suggested in last year's report that absence of signs of fluorosis in the population of those areas in the Punjab where fluorine is prevalent in water supplies might be due to the better Punjab diet. This question requires investigation.

Surveys have been in progress for some time past regarding the incidence of malaria, hookworm and leprosy. It is stated that, in this way, the geographical distributions of these diseases in the province are gradually being mapped out.

Delhi.

16. In New Delhi it is stated that the school medical service was in its fourth year of existence in 1940 and that progress was maintained during the year. Two large schools, namely, the D. A. V. and the Harcourt Butler high schools came into the scheme during the year. The former had its own clinic with a part-time medical officer and the latter availed itself of the services provided by the Municipal Committee.

In the case of boys the number examined during the annual routine inspection increased from 1,243 in 1939 to 1,612 in 1940 and in the case of girls from 1,427 to 1,529. The percentage of boys showing defects on medical examination was 71 in 1940 as against 70 during the previous year and amongg irls it was 66 as against 63 during 1939. The higher percentages of defects shown in 1940 as against 1939 are stated to be due to a change in the system of classification. On the other hand, the Chief Health Officer points out that there was an appreciable diminution in the percentage of children with defects requiring treatment. He also states that there is reason to believe that the medical care has begun to exert a beneficial influence on the general health of the children. As in previous years the main defects are stated to be malnutrition, dental trouble and defects of vision, all of which are preventable.

It is stated that the school dentist has drawn attention to the large proportion of dental defects. The dentist carried out 474 extractions, 406 fillings, 93 nerve treatments and 74 cleanings of tartar deposits. In addition treatment was given for 39 cases of gingivitis and 17 cases of calcium deficiency. The school dentist carried out a considerable amount of propaganda illustrating his lectures by films obtained from the School Medical Service Library. A special pamphlet on " The care of the teeth " was prepared and issued.

The ophthalmic specialist is also stated to have had a busy year in his clinic. The numbers of boys and girls with errors of refraction were 259 and 244 respectively. The Chief Health Officer draws attention to the fact that, although the defects were brought to the notice of the parents, in the majority of cases the advice to correct these errors was not carried out. Trachoma is said to be fairly widely prevalent among the children, 119 cases having been detected in boys and 96 among girls.

The cost of the school medical service was approximately Rs. 10,625 of which Rs. 3,397 was recovered in fees at the rate of two annas from each school child.

While in New Delhi substantial progress has been recorded in the medical care of school children the Chief Health Officer reports that the condition in Delhi city continues to be unsatisfactory. A scheme was submitted for the reorganisation of the service in that city but it was rejected by the municipality which declined to levy a charge of two annas per pupil for the maintenance of the service. It is hoped that the success achieved in New Delhi will serve as an object lesson to the authorities in Delhi city and that, in due course, a similar service will be developed there also. It should be remembered that a school medical service is one of the most potent forces for improving the health of the rising generation. In the meantime what is happening in Delhi is stated to be a fruitless inspection of the children in all schools without any arrangements for follow up or treatment of the defects discovered by such inspection. Of 15,625 boys examined in Delhi city 83 per cent and of 4,375 girls 50 per cent were found to have some defect or other. Another group of 2,399 girls was inspected under the scheme organised by the Delhi Health Society and of these 33 per cent were found to have defects.

In the Notified Area Civil Lines a school medical service has been provided only for the schools maintained by the Committee in Timarpur colony. The woman doctor in charge of the maternity and child welfare centre and the medical officer in charge of the Balak Ram Hospital functioned as school medical officers for the girls and boys respectively. Of 240 boys examined 62 per cent were shown to have defects requiring treatment and the corresponding figure in the case of girls was 52 per cent.

The Chief Health Officer states that appreciable progress was made in the development of school health work in the rural areas. The number of children subjected to routine medical examination increased during the year. In addition, the schools were visited by the members of the public health staff and it is stated that improvements were made in the sanitation of the schools. These improvements included the provision of bored hole latrines and of suitable drinking water arrangements for practically every school, the satisfactory disposal of sullage from kitchens in the case of boarding schools, the provision of bathing facilities and encouragement of the cultivation of vegetable and flower gardens by the students. First aid boxes were provided in the schools for the treatment of the children. Of 9,103 boys examined nearly 62 per cent were found to have some defect or other and among 549 girls the corresponding figure was 29 per cent. The Chief Health Officer draws attention to the cooperation that exists between the Education Department and the District Board and expresses the hope that the progress achieved during the year will be maintained.

As regards health education the most important advance is stated to have been that of making hygiene a compulsory subject in all the schools of Delhi Province. Suitable text books for the different classes have been prescribed by the Text Book Subcommittee and it is stated that courses of instruction in hygiene are arranged for teachers both in Teachers' Training Schools and at refresher courses. Special attention is paid to instruction in the use of the school medical box in order that the school master may carry out efficiently the treatment of minor ailments among the pupils. The health department staff in the rural areas also took an active part in health education and gave demonstrations of the day to day measures to be taken for the prevention of disease and for the improvement of the individual's health. It is stated that over 1,048 lectures were delivered by the rural health staff in the schools.

Health talks on the radio were also arranged for the rural population. In the urban areas it is pointed out that a considerable amount of health education is being carried out among the students, particularly by the ophthalmic and dental specialists and the antimalaria officer in New Delhi.

It is stated that advantage was taken of all fairs and exhibitions for the propagation of knowledge regarding health matters. A successful stall " Milk for the millions " was opened at the cattle show in New Delhi. Milk was available for sale at the counter and useful literature was distributed among those who visited the stall.

The Najafgarh health unit has proved to be of great value as a centre for demonstrating the methods of rural health administration. Students from the Lady Reading Health School, the Lady Irwin College and the Lady Hardinge Medical College visited the health unit for the purpose of studying such aspects of rural health administration as are useful to them.

The number of factories in Delhi Province subject to the control of the Factories Act increased during the year from 115 to 127. It is stated that, in all the factories the water supply was sufficient and satisfactory, that lighting arrangements were good and that sanitary arrangements continued to show improvement. No epidemics were reported from any factory and the health of the inhabitants was found to be generally good. In 33 thread ball factories employing mostly women, it is stated that the working conditions have shown a marked improvement since 1938, when the provisions of the Factories Act were brought into operation. Most of these factories are situated within the Delhi municipality and the Chief Health Officer states that the conferment of powers as an additional Factory Inspector on the Health Officer of Delhi city has been recommended.

United Provinces.

17. In this province there was no extension of the district health service during 1940, the number of districts employing health staff being 37. The post of Assistant Director of Public Health, Malariology and Epidemiology, which had been held in abeyance for a short period, was revived during the year.

Model byelaws for the regulation and inspection of slaughter houses in municipalities were revised in accordance with the recommendations of the Imperial Council of Agricultural Research. It is stated that a number of sanitary improvements were effected by the rural health staff. These included improvements to existing wells, construction of new wells on proper lines with the provision of hand pumps, provision of ventilators in village houses, construction of soakage and manure pits, improvement of cattle sheds on sanitary lines, provision of drains, filling of pits and excavations and removal of piggeries and manure heaps beyond the inhabited areas. It is stated that, in a few cases, prosecutions were carried out under the local byelaws for ensuring that the necessary improvements were carried out.

Revised type designs were prepared and issued in respect of infectious diseases hospitals, latrines, urinals, meat markets and village houses.

The Public Analyst examined 12,356 samples of foodstuffs including 5,769 samples of ghee, 2,705 of milk and 1,772 of oils. The percentage of adulterated samples was 21·6 as against 18·8 in the previous year.

The Hygiene Publicity Bureau of the Public Health Department is in charge of health propaganda. The officers of the Bureau are associated with the working of the Provincial Red Cross Society and the St. John Ambulance Association and by this means wasteful overlapping of effort by the Public Health Department and these voluntary organisations is prevented. The total number of magic lantern lectures was 127 and of other lectures 107. About 205,000 leaflets, booklets and pamphlets and 3,356 posters on epidemic diseases and other health subjects were distributed. A new film on nutrition was prepared. The Bureau also assisted in the training of honorary workers of the Rural Development Department of the Government and of certain other social workers.

The propaganda van maintained by the Hygiene Publicity Bureau visited 22 districts in the province covering 6,105 miles and gave 105 cinema demonstrations to a population of about 214,000. In addition a portable projector was used in five districts with audiences totalling 10,000 and 30 cinema shows were given.

Sanitary arrangements were made in respect of all fairs and festivals in the province during the year and it is reported that no outbreak of any epidemic disease took place in connection with these gatherings.

Bihar.

18. In Bihar the school medical service consists of four medical officers and four assistants. An examination of the pupils of all high schools and middle schools was carried out. A woman school medical officer is also maintained by Government and she carries out medical inspection of girls' schools. In addition health officers of some district boards carried out the examination of school children in the rural areas. In addition to these activities the school medical staff carried out health education by lectures and magic lantern demonstrations in the schools. They also inspected the school premises and gave advice to the school authorities for the improvement of environmental sanitation.

The Public Health Bureau attached to the Office of the Director of Public Health is in charge of health propaganda. Posters and pamphlets on health matters are prepared and issued to local bodies and organisers of health exhibitions. It is stated that the staff employed by the various local bodies carried out health propaganda as a routine measure and that they particularly took advantage of the various fairs and festivals in the province for carrying the message of health to the general population. The medical officer of a motor dispensary, which has been sanctioned as a permanent measure by the Provincial Government, carried out intensive propaganda among the affected population during his visits to the cholera infected areas.

Orissa.

19. The Provincial Government have under consideration the compilation of a public health code for the province and special staff have been appointed for the purpose. Under the new Orissa Food Act a set of rules was framed by the Government. Three sets of byelaws were framed to deal with the nuisances arising out of rice mills established in rural and urban areas and these byelaws have been circulated among the local bodies for adoption by them at an early date.

Arrangements were made for the medical examination of girl students in the schools situated in the towns of Cuttack, Berhampur and Parlakimedi.

With the rapid increase of work in the Pathological and Public Health Laboratory the Government agreed to appoint an assistant Analytical Chemist.

A field investigation regarding the nutrition of the population was carried out in one of the smaller districts of the province by two health inspectors under the supervision of the Assistant Director of Public Health. A special health inspector was appointed to work under the Assistant Director of Public Health for the efficient supervision and inspection of vaccination work in the rural areas and of other public health activities. It is stated that, in addition to the usual methods of public health propaganda, three health exhibitions were organised in the province during the year.

A conference of the public health staff of the district of Ganjam was held at the end of the year under the chairmanship of the Director of Public Health. A number of public health subjects of special importance to the district were discussed and programmes of work were drawn up.

The Local Self Government Act was extended to the district of Sambalpur. The compilation and registration of births and deaths in the towns of Kendrapara, Jajpur and Balasore were transferred from the Police to the respective municipalities.

Bengal.

20. The Provincial Government are contemplating, it is reported, the enactment of a consolidated Public Health Act for the purpose of incorporating all the existing health legislation in the province into a single comprehensive measure. The Bengal Food Adulteration Act of 1919 is being amended in order to remove such defects as have been shown to exist in the working of the Act.

A scheme for the complete reorganisation of health services in the province has been under consideration by the Government. It is stated that the scheme will first be introduced in the Dacca district as a whole and in certain subdivisions in the districts of Rangpur, Faridpur, Jessore and Hooghly. The district boards concerned have agreed to participate in the scheme. In the Chittagong Hill Tracts no health organisation has so far been employed ; a scheme for the introduction of health administration in this area has been accepted by the Government and a few members of the required personnel were trained during

the year. A scheme for the appointment of health staff in Darjeeling district is also stated to be under the consideration of the Government. A scheme for the reorganisation of the existing municipal public health services was submitted to Government by the Director of Public Health.

It is reported that a number of health exhibitions were held in various parts of the province during the year and that the Bengal Public Health Department supplied posters, pamphlets and models relating to health subjects to these exhibitions. At a cost of Rs. 1,600 two models of clean villages were prepared and demonstrations were arranged at certain important exhibitions and in Rural Reconstruction and Settlement training camps. Enamelled posters of suitable size on "Prevention of malaria" and on "Tuberculosis" were also prepared and were supplied to railway authorities in the province for permanent exhibition at railway stations.

Three important festivals took place during the year. The Ganga Sagar *mela* was held from the 13th to the 15th January 1940 and about 80,000 pilgrims visited the festival centre. The Bengal Public Health Department took the necessary preventive measures against infectious diseases in cooperation with the Calcutta Port Health Department, the Calcutta Corporation and the District Board of 24-Parganas. It is stated that nine cases of cholera occurred at the *mela*.

The Langalband *mela* took place in the Dacca district on the 15th April and about 50,000 pilgrims were present. Arrangements were made by the district board for the continuous supply of chlorinated water for drinking purposes. It is stated that three patients were admitted into the cholera ward.

The Gajan *mela* was celebrated at Tarakeswar in the Hooghly district about the middle of April for a period of six days, the gathering being in the neighbourhood of 20,000 to 25,000 pilgrims. The necessary sanitary measures were taken.

Central Provinces.

21. The scheme under which a subassistant health officer is posted to each *tehsil* in the province was in operation in its second year in 1940. These officers are stated to have devoted special attention to water supply, conservancy and the health of the school children. Classes were held for village uplift workers and they were mainly attended by school teachers. At these classes the subassistant health officers were deputed to teach the elementary principles of public health. These officers also helped in arranging exhibitions and village uplift rallies. In addition, these officers checked vital statistics and vaccination registers.

A motor travelling dispensary has been working in Nagpur district since the year 1939 and it is stated that its services have been greatly appreciated by the people. It has 48 wayside treatment stations and people from the villages on the roadside and from villages in the interior attended the dispensary. During 1940 this dispensary treated 45,490 patients.

Bombay.

22. A consolidated Public Health Act is stated to be under the consideration of the Government. For progress of rural health work District Rural Development Boards have been established in almost all the districts. These boards are entrusted with the task of improving agriculture, animal husbandry, sanitation and health, education, communications, cottage industries, co-operation, marketing and such other activities as are concerned with the social and economic betterment of the people. In a number of villages it is stated that provision has been made for cattle sheds, for the removal of dung heaps outside the inhabited portion of the village, the sanitation of the surroundings of houses, the celebration of village improvement weeks, the construction of new wells and trench latrines and repairs to tanks and wells.

As regards health propaganda, the Bombay Presidency Baby and Health Week Association assisted 246 centres in organising health and child welfare exhibitions and in arranging cinema shows with the help of its cinema unit.

Sind.

23. Health legislation during 1940 in the province of Sind included an amending Act for the Karachi Vaccination Act, 1879, and for the Bombay District Vaccination Act, 1892, as regards its application to Sind. Section 119 of the Bombay District Local Boards Act, 1923, was amended so as to make it compulsory for each district local board to appoint a district health officer. Under this enactment appointments were made by the district local boards of Karachi and Nawabshah.

Public health works of special importance during the year included the approval, by the Board of Public Health Works in Sind, of a project for the drainage of Kambar town costing Rs. 1,00,000. Improvement to the Sukkur water supply distribution system, which is estimated to cost Rs. 3,92,500, is nearing completion. Of a total cost of Rs. 29,80,748 for improving the water supply of Karachi, works costing Rs. 2,49,213 were completed during the year and the remaining portions of the scheme are being proceeded with. Schemes for the improvement of the drainage and water supplies of a number of towns in the province were under cosideration during the year.

No special staff have been maintained for health propaganda but it is stated that the importance of this subject has been constantly kept in mind and that every opportunity is taken to give instruction to the people in matters relating to their health and nutrition and to the prevention of disease. Public health stalls were put up at all rural reconstruction and other exhibitions organised in the province. Propaganda with the aid of nutrition charts was carried out in rural reconstruction and other exhibitions in the province. Nutrition charts were printed in Sindhi and distributed free of charge among teaching institutions. A pamphlet on "Milk" was prepared and widely distributed. A simple pictorial poster illustrating the value of milk as food is said to be under preparation and will be ready for issue shortly.

A scheme for a separate staff for health propaganda was submitted to the Government and the scheme has been accepted in principle. The medical officers in charge of the motor travelling dispensaries in the province were

supplied with magic lanterns and propaganda material in order that they might combine health education of the people with the administration of medical relief.

The medical officers in charge of the dispensaries in the rural areas have been directed to carry out a monthly medical examination of the children attending elementary schools situated in the villages in which the dispensaries are located.

Facilities have been made available to registered medical practitioners at all Government hospitals for the free microscopic examination of sputa from patients suffering from or suspected to be suffering from tuberculosis. The Government also issued orders that all laboratory examinations for the inpatients and outpatients of Government or Government aided hospitals and dispensaries should be carried out at the Chemico-bacteriological Laboratory, Karachi, free of charge for a period of three years. In 1937 the Government prescribed provisionally for a period of three years in the first instance, an average rate of Rs. 2 for the bacteriological examination at the Chemico-bacteriological Laboratory, Karachi, of each specimen sent by a local body from cases of infectious disease. As a measure of further assistance the Government have directed that, for a period of one year in the first instance, five samples of such material sent by local bodies should be examined free of charge and that any sample in excess of this number should be examined at the rate of Re. 1 per sample.

The provisions of the Prevention of Adulteration Act, 1925, were enforced in 14 out of a total of 26 municipalities in the province. Some of the poorer municipalities have suggested that this work should be undertaken by the Government. A scheme was prepared for this purpose and for the control of adulteration in rural areas. This scheme is stated to be under the consideration of Government.

Sanitary boards have been formed at all district headquarter towns in order to ensure the cooperation of the local health authorities in each area on the carrying out of health measures.

Madras.

24. A comprehensive Public Health Act was passed in Madras Presidency during 1939 and this has been followed by the issue of rules under the various sections of the Act during 1940. The Madras Prevention of Adulteration Act was extended to more local areas and, during the year, 104 local bodies were enforcing the Act. A consolidated set of instructions has been issued with respect to the control of factories, workshops, etc., outside industrial areas.

As regards health propaganda it is stated that the health staff gave a large number of lectures and magic lantern and cinema demonstrations on health subjects during the year. Broadcasts on public health subjects were given from the radio stations at Madras and Trichinopoly. As in previous years the "Health week" was celebrated in almost all parts of the Presidency.

In order to combine medical and preventive health work in the rural areas three groups each consisting of 61 rural medical practitioners were trained in public health work during the year.

It is reported that adequate sanitary arrangements were made for all fairs and festivals in the province and that no outbreak of any infectious disease occurred during or after these festivals.

Coorg.

25. A Public Health Act and a Food Adulteration Act for Coorg are stated to be under consideration. New conservancy byelaws were brought into force in the municipalities and notified areas of the province during the year. Pressure was brought to bear on the local authorities to prosecute householders who failed to provide latrines.

The Education Department agreed to making hygiene a compulsory subject in all schools and a textbook was prepared during the year for facilitating the teaching of the subject. Diet surveys were carried out in hostels, hospitals, villages and among the labour population of certain estates by an officer trained at the Nutrition Research Laboratories, Coonoor, and he was assisted in these investigations by a research worker from the staff of the Laboratories. These two officers also carried out anæmia surveys in certain schools and the results of administration of iron to cases of anæmia were also investigated.

Improvement of environmental sanitation included the provision of 1,088 bore hole latrines, 90 pit latrines, six latrines on the bucket system, ten soakage pits, five urinals, 51 rubbish pits and 22 temporary trenches.

Assam.

26. The Director of Public Health states that proposals for the reorganisation of the Public Health Department were under consideration by the Government. A scheme for the establishment of a " Health unit " in Golaghat subdivision with the cooperation of the International Health Division of the Rockefeller Foundation was approved by the Government and it is stated that the unit is to start functioning during 1941. An officer of the Department was deputed for training before taking up his duties as the medical officer of health of the health unit.

It is stated that plans were completed for a scheme of general public health work in Hojai. Here it has been proposed that, in a group of 16 villages, a trained staff will be employed for vaccination, registration and verification of vital statistics, maternity and child welfare work, prevention of epidemics and the improvement of village sanitation. The scheme provides for cooperation with the Assam Medical Research Society, whose malaria staff will assist in dealing with malaria problems, and with the local board, which will provide the midwives for rural maternity relief as well as the quarters for the staff. The intention is to investigate the possibilities of developing a rural health organisation on cheap and efficient lines and to expand the scheme to other parts of the province as and when funds permit.

The appointment of a special engineer in the Public Works Department for drainage and embankments has been proposed and the Director of Public Health expects to be able to carry out permanent antimalaria measures with the cooperation of this officer. As a beginning, flushing syphons in streams and channels have been provided and it has been proposed to expand this work with the help of the Assam Medical Research Society.

There is only one festival centre in the province attracting a large number of pilgrims, namely Kamakhya. Numerous smaller festivals are held in different parts of the province. It is reported that in 1940 no outbreak of an epidemic disease occurred at any of these centres.

SECTION IV.

MATERNITY AND CHILD WELFARE.

Introduction.

27. A special section on maternity and child welfare appeared in the annual report of the Public Health Commissioner for the first time in 1927. At that stage this branch of public health work had not progressed far in India, but the degree of prominence which it had assumed in other national health programmes was compelling attention in this country. It was therefore considered essential that greater publicity should be given not only to the various aspects of the maternity and child welfare problem in India but also to the newer developments in other countries, with a view to stimulating progress in India.

The pioneer work for the improvement of the health of mothers and children by voluntary organisations and by certain progressive local authorities in England, together with the stimulus provided by the war of 1914-18 for a betterment of social conditions, led to the passing of the Maternity and Child Welfare Act in England in 1918. Under this Act local authorities were enabled to make further provision for the health of expectant and nursing mothers and children under school age. Schemes approved by the Ministry of Health receive a grant from the Exchequer of 50 per cent of the expenditure.

At the end of 1938 there were in England and Wales 3,261 welfare centres and a staff equivalent to the whole time services of 2,877 health visitors for a population of approximately 41 millions. A special department of the Ministry of Health, employing one senior medical officer, one deputy senior medical officer, four medical officers and three women inspectors, supervised the schemes under the local authorities. In India, for a population ten times as large, there were in 1939 approximately 1,020 welfare centres employing 351 health visitors. Although the population of several of the provinces of India exceeds that of England and Wales, only two, namely Madras and Bengal, have a maternity and child welfare section at the headquarters of the provincial public health department with a woman medical officer possessing the necessary public health training to qualify her for supervising and organising the work.

Progress in this branch of health administration has therefore been disappointingly slow in India during the twelve years since the first special section devoted to maternity and child welfare appeared in this report. The following quotation from the 1927 report indicates some of the main obstacles to progress. "Maternity work is not likely to advance much until the general level of education in the country, especially among women, is raised. Unless and until this happens progress is hindered in three important ways (1) lack of public opinion, (2) inability of the women to appreciate new methods and especially the principles of preventive medicine and (3) lack of educated women to take up the work which is waiting to be done." Although there has been a recognisable, if minor, advance in the education of Indian women in recent years, each of these obstacles still continues to bar the way and each reacts adversely on the other. The demand from the individual and from the public for a higher standard of preventive health work will arise only when the value of such a service has been demonstrated to the people. Their general outlook is conservative and their reaction to newer methods and ideas is still largely one of opposition. The provision, on a wide scale, of health services for mothers and children depends

largely on the availability of trained personnel and until the women of the country are prepared to qualify themselves for preventive health work in sufficiently large numbers no reasonably rapid advance can be made in this branch of public health administration.

Maternity and child welfare work in the Provinces suffers from lack of a planned programme and often from misdirection. The preventive and educational aspects of the work are not fully understood, and many welfare centres still exist which function mainly for treating minor ailments and for providing comforts to those mothers and children who are too poor to buy them. The Central Advisory Board of Health, at its second meeting in 1939, reviewed the position regarding maternity and child welfare work in India and recommended to the earnest consideration of all Provincial and State Governments a comprehensive report on the subject prepared by a special committee appointed by the Board. The Board drew attention to the undesirability of welfare centres assuming the functions of a hospital or dispensary and pointed out that the preventive aspect of maternity and child welfare centres is primary and that it is most important that this should always be kept in mind. In order that preventive work in this branch of health administration may be placed on a sound basis, the Board recommended the appointment of trained women doctors to take charge of maternity and child welfare centres in municipal and local board areas and to conduct prenatal and postnatal clinics in these centres. The Board also recommended the appointment in each Province or State of a senior woman medical officer with special qualifications and experience in maternity and child welfare work.

The replies received from the Provinces to the recommendation of the Board regarding the appointment of a senior woman medical officer show that in Madras and Bengal alone has such an officer been appointed. In the United Provinces the present arrangement is that the work is carried on by a medical woman employed by the provincial branch of the Indian Red Cross Society. In the Punjab a senior woman doctor has been appointed as Assistant to the Inspector General of Civil Hospitals and it is stated that she visits welfare centres from time to time. Further, an experienced health visitor has held the dual appointment of Inspectress of Health Centres and Principal of the Health School, Lahore, since 1927 and she acts as an assistant for maternity and child welfare to the Director of Public Health. Bihar has under consideration a scheme for the appointment of a medical officer for the combined post of supervisor of women's hospitals and of maternity and child welfare services. The N.-W. F. Province is planning to appoint a senior health visitor as supervisor of maternity and child welfare services and midwives. The replies of the remaining provinces indicate that no such appointment is contemplated in the near future. It is certain that, without the appointment of a suitably qualified woman medical officer at the headquarters of the provincial health organisation, little progress can be expected in the organisation of maternity and child welfare work on proper lines.

The position in regard to midwives and health visitors also requires mention. The shortage of educated women for training as midwives and health visitors is gradually being made good. Schools and classes for the training of *dais* are attracting a better type of candidate. The progress will be considerably accelerated if the women trained can be absorbed into a well regulated salaried service and if a public demand for a higher standard of midwifery can be created.

The number of health visitors trained annually in India is approximately 60, a number too small to meet the demand for their services. In Madras and

the Punjab, where the maternity and child welfare centres are organised by the provincial public health department and the training schools for health visitors are Government institutions, there appears to be no difficulty in securing a full complement of students each year and, although the number of students trained is small, it is approximately equal to the number which can be absorbed annually into the provincial organisation. In other provinces suitable candidates are not forthcoming in sufficient numbers. This may be due to the fact that the health visitor's life is a hard one. In her daily contact with the people she meets with apathy, ignorance and at times active hostility. Hers is essentially the work of educating the womenfolk in hygienic modes of living and in the principles of mothercraft. The results of such educative work are very slow to appear and there is not therefore the satisfaction of quick and obvious achievement as a compensation for the hardships of her official life.

The rural areas present a difficult problem in regard to the employment of trained staff. The health visitor or midwife who has been brought up in a town finds it difficult to give up the amenities of urban life to which she has been accustomed. The conditions of travel in the rural areas are trying because dust and heat and the absence of rapid means of conveyance make work difficult, and perhaps no other profession makes so great a demand on the endurance, courage and mental equipment of a woman worker. There is therefore considerable difficulty in recruiting and maintaining, for the rural population, trained *dais*, midwives and health visitors. As regards the *dais*, the Chief Health Officer, Delhi, has been giving training to selected village girls in order that they may return to their homes and work among the people. The results of this experiment will no doubt be of interest to the health authorities of other parts of India also.

As regards health visitors an initial difficulty is that the candidates for training require a higher standard of general education than the *dais*. Until the level of education in the countryside rises appreciably it may not be possible to obtain sufficient numbers of village girls as candidates for training as health visitors. But the desirability of selecting candidates from the rural areas, wherever possible, must be kept in mind. Further, the offer of a compensatory allowance for rural work and better conditions of service, such as security of tenure and liberal leave rules, may make rural service attractive to health visitors from urban areas.

Remarks on individual provinces.

28. Brief notes on the activities in the different provinces during 1940 are given below.

In the North-West Frontier Province the provincial *dais* training centre in Dera Ismail Khan ceased to be financed by the Government and was taken over as a district centre by the Red Cross Society. This leaves only one official *dais* training centre in the province, namely, Peshawar. Welfare centres were opened during the year in Dag Ismail Khel in the Nowshera tehsil and in Charsadda respectively.

New rules under the Midwives Act for the training of *dais* were drafted and approved by Government.

The appointment of a Provincial Inspectress of *dais* was made during the year. Her duties are to tour the whole province for inspecting welfare centres and the work of subsidised *dais* in the villages.

In 1936 there were 77 maternity and child welfare centres in the Punjab with 119 subcentres. By 1940 the numbers rose to 106 centres and 149 subcentres. The health visitors attached to these centres have all been trained at the Punjab Health School and they are stated to be busily training *dais* in towns and rural areas. In 1936 there were 1,147 certificated *dais* ; in 1940 their number was 2,250 while 2,181 were under training. Approximately 25,000 cases of labour were conducted by trained *dais* in 1936 while in 1940 the number was over 39,000. These figures indicate steady and satisfactory progress.

The Chief Health Officer, Delhi, states that in New Delhi appreciable progress was achieved in maternity and child welfare work during 1940. The number of confinements undertaken by the centres rose from 1,218 in 1939 to 1,235 in 1940. In the areas served by the centres it is stated that 60 per cent of the births were conducted by the centre staff and that, of the total number of births registered in New Delhi, the centres conducted 33 per cent. A gratifying feature is that, while the maternal mortality rate for the city as a whole was 4·6 *per mille*, no death from childbirth took place among the confinements for which the centres were responsible.

The infant mortality rate in New Delhi was 84 per thousand in 1940 while the rate among infants cared for by the welfare organisation was as low as 51.

A committee exists for coordinating the activities of the welfare centres and of maternity hospitals known as the Delhi Maternity Services Coordinating Committee and it is stated that full advantage has been taken of this organisation by the New Delhi centres. The success achieved in the control of maternal and infantile mortality is stated to be largely due to the many consultations which took place, chiefly at the Lady Hardinge Hospital.

The three centres in the Civil Lines are also stated to have shown progress They supervised 66 per cent of the confinements in their areas and 25 per cent of the total births registered in the Civil Lines. It is stated that, for the first time, the infant mortality rate fell below the three figure mark to 98. Another encouraging fact is that no maternal death took place among the confinements conducted by the centres. The doctor in charge was given a three months' training in the preventive aspect of child welfare work at the Lady Reading Health School during the year, and it is stated that the value of this training is evident in the improved administration of the centres.

As regards Delhi city it is reported that a different state of affairs exists. It is pointed out that " there is no booking of cases, no systematical clinic organisation and that the health visitors' time is taken up with work for which they are neither fitted nor intended ". The Chief Health Officer states that the infant mortality rate has been rising and he expresses the hope that this will serve to remind the Municipal Committee of the urgent need for reform.

As regards rural areas maternity and child welfare work is done in the Najafgarh health unit and in the remaining rural areas of the province. In the Najafgarh health unit it is stated that the percentage of the total confinements conducted by the staff of the centres rose from 27 in the previous year to 36 in 1940. An encouraging feature is that 76 per cent of the cases attended by the staff received adequate prenatal care both in their homes and at the centre.

It is stated that, apart from the education of the women in mothercraft, sanitary inspectors have been instructed to include the responsibilities of fatherhood in their talks to menfolk.

Of the 1,775 infants on the cards of the centres in the health unit it is stated that 48 per cent attended the clinic regularly and that the mortality rate among these infants was 57·5 per thousand compared with 164 per thousand for the unit area as a whole. However it is pointed out that, of the 102 deaths among the infants in the care of the centres, 29 per cent were due to respiratory diseases and 37 per cent were due to gastro-intestinal diseases which are both preventable conditions. There appears therefore to be considerable scope for a further reduction in infantile mortality through the education of mothers.

It is stated that among 901 confinements conducted by the staff of the health unit centres not a single maternal death took place.

In the remaining rural area of the province three centres were at work at Nangloi, Narela and Mahrauli. These centres conducted 1,120 confinements, or nearly 70 per cent of the total number of births in that area. These figures give only an average figure of eight cases per month for each trained *dai* employed at these centres, and the Chief Health Officer points out that a considerable increase on this figure is desirable. It is stated that maternal mortality figures among the cases undertaken by the centres and also among those registered in the thana were very low, these being 1·7 and 2·6 per thousand respectively. During the year a new centre was opened at Shahdara, a growing suburb of Delhi. It is stated that this centre is doing good work.

The application of the Punjab Nurses Registration Act to Delhi Province resulted in the extension of recognition to the existing untrained *dais* of the Province. The Chief Health Officer states that this has had a harmful effect on the working of centres since untrained *dais*, armed with the certificate, have been able to question the superiority of the trained *dais* employed in the centres. There is however hope for the future because, when the present generation of untrained *dais* ceases to exist, this class of untrained person will be eliminated from the practice of midwifery.

Four selected village girls were trained at the Victoria Zenana Hospital, Delhi, for a period of two years in order that they might go back to their homes and work among the people under conditions familiar to them. The Chief Health Officer considers that this is perhaps the only way of providing skilled attendance during confinement in the rural areas, because the midwife brought up in the town is unwilling to give up the amenities of urban life and to settle contentedly among the village population.

In the United Provinces the total number of maternity and child welfare centres which functioned during 1940 was 334. Among the centres which worked during the previous year nine were closed and 16 new centres were opened. It is stated that new buildings for centres were constructed in Benares, Almora and Lucknow cantonment. During the year a children's nursery was started in the Silver Jubilee Health School in order to provide practical training to the pupils of the school.

In Bihar it is reported that there are three child welfare clinics in Patna and that each has a large regular daily attendance. Attempts are being made in this province to train the indigenous *dais* for performing a better type of midwifery. In two women's hospitals a brief course of practical training is given to these village women by lady doctors and then the women return to their homes as practising midwives.

It is reported that maternity and child welfare work is being done at several centres by the Jharia Mines Board of Health and at Jamshedpur. Arrangements are being made by the Hazaribagh Mines Board of Health to start similar work at Giridih, Bhurkunda and Argada. It is stated that prenatal work is done at the Lady Elgin Hospital, Gaya, 698 cases being dealt with during the year.

In the province of Orissa, well organised maternity and child welfare centres exist in the four towns of Cuttack, Balasore, Sambalpur and Berhampur. Besides the above centres smaller organisations exist in some other places also, *viz.*, Khurda and Puri in Puri district, Bargarh in Sambalpur district, Parlakimedi and Russelkonda in Ganjam district, Koraput, Jeypore and Umerkote in Koraput district.

Indigenous *dais* trained under the Victoria Memorial Scholarship Fund have been employed in certain rural hospitals and dispensaries for work among the rural population.

In Bengal the organisation of maternity and child welfare work is being attempted on systematic lines. A post of Superintendent of Maternity and Child Welfare was created with effect from September 1939 for the purpose of organising the work in the province as a whole. The Superintendent makes local inspections and advises the local authorities and voluntary organisations in the starting of welfare centres and in their efficient maintenance. The Government have prepared two type schemes for welfare centres ; one consists of the centre alone and the other has an attached maternity ward having two to six beds. Provision is made for the housing of the centre staff ; the minimum staff required for each welfare centre consists of a health visitor, a trained *dai* and the requisite menials. Fifty per cent of the capital expenditure is met by the Government in the case of a scheme brought into being by a local body subject to a maximum of Rs. 3,000 for a centre without maternity beds and a maximum of Rs. 4,000 where a maternity ward is attached to the centre. The pay of the health visitor is also met by Government.

It is stated that there has been a good response from local bodies for the starting of maternity and child welfare schemes and that in 1940, nineteen schemes were approved and recommended for Government aid and that twelve of them have already begun to receive grants. During 1940-41 the Government provided a sum of Rs. 50,000 as grants-in-aid for the establishment of maternity and child welfare centres in the province and a sum of Rs. 35,000 to meet the recurring grants for welfare centres and the training of *dais*.

One of the objects of providing a maternity ward to the welfare centre is stated to be that of securing facilities for the training of *dais*. It has been suggested that, in order to ensure proper control of practising *dais*, the Provincial Nursing Council should make provision for their registration.

The Central Provinces and Berar Red Cross Welfare Committee maintained 79 welfare centres (57 urban and 22 rural) in 1940 compared with 74 during the previous year. The total expenditure incurred during the year was Rs. 51,430 towards which the Government gave a grant of Rs. 32,500.

Dais are trained at almost all centres and 77 *dais* were examined and given certificates during the year.

In Bombay Presidency a new centre was affiliated to the Bombay Mofussil Maternity, Child Welfare and Health Council during the year. The Council aided in all 46 centres with a sum of Rs. 31,879. The Council also gave

grants to the extent of Rs. 2,195 to a scheme for the training of *dais* at various centres under the auspices of the Lady Wilson Village Maternity Association. These grants amounted to a third of the total cost of the scheme.

The Bombay Presidency Baby and Health Week Association assisted 246 centres in organising health and child welfare exhibitions including cinema shows on health subjects at different centres.

The Government of Sind have sanctioned a proposal for the establishment of subsidised maternity centres in rural areas. The minimum staff for a centre consists of a trained *dai* and a peon. The Government will bear a third of the recurring expenses. At a place where no Government or local board maternity home or hospital exists, voluntary associations are also eligible for the Government grant for any centres they maintain.

Under an eight year scheme five candidates are to be trained as midwives every year at the Lady Dufferin Hospital, Karachi, and the first batch of five candidates underwent training during the year under review. It is stated that, in spite of the payment of a monthly scholarship of Rs. 20 to each pupil and the guarantee of appointment to successful candidates great difficulty has been experienced in obtaining suitable Sindhi girls to take up the course.

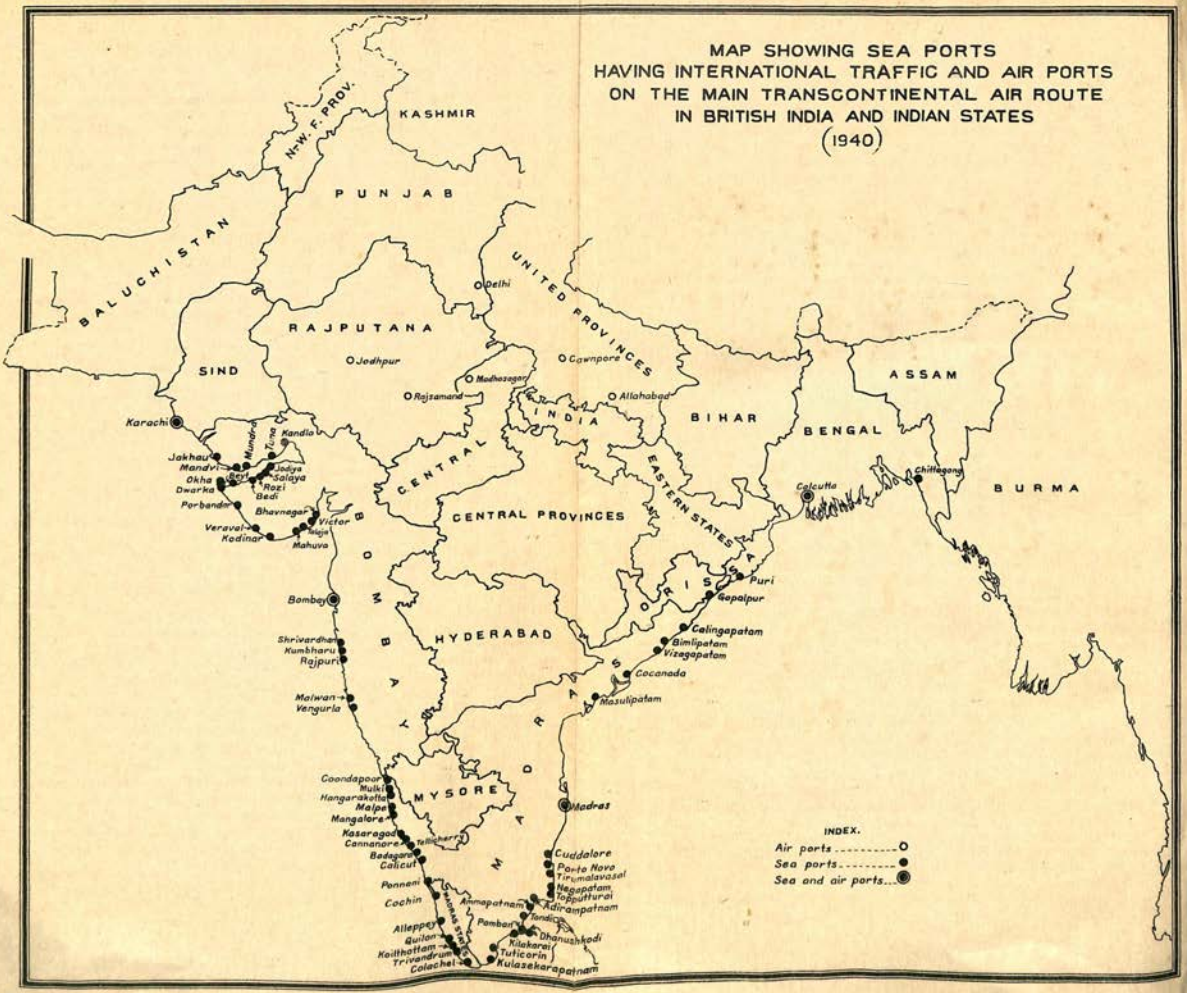
In Madras Presidency it is stated that maternity and child welfare work has developed steadily and satisfactorily during the year, and that local bodies cooperated with the Public Health Department. The organisation and routine inspection of these activities were carried out by the Assistant Director of Public Health (Maternity and Child Welfare). The post graduate course in maternity and child welfare was held as usual during the year and was attended by women medical officers from local bodies. The health visitors who passed out of the Government Training School for Health Visitors in April 1940 have been provided with work under local bodies and private associations and another batch is undergoing the course.

In Coorg a health visitor was appointed in September 1940 to work in Mercara municipality and it is reported that good work has been done. Since this appointment was made the number of maternity cases delivered in Mercara Civil Hospital has greatly increased. Two days in the week, the health visitor holds clinics in the hospital. On other days she pays house to house visits and advises women regarding care of the house, environmental and personal cleanliness, care of expectant mothers, attention during confinement and care of children under five years of age. It is stated that some measure of her success may be gauged from the large increase in the number of cases delivered in the Mercara civil hospital after her appointment.

The infantile and maternal mortality rates for 1940 were 132·6 and 10·4 respectively as against 141·7 and 11·0 for the previous year.

In Ajmer the King George V Memorial Maternity Home was constructed during the year and it is stated that the institution has already begun to prove its usefulness. There was no other new development in the field of maternity and child welfare work during the year.

In Baluchistan three child welfare centres exist in Quetta. They are all under the charge of qualified health visitors. In the districts midwives are present on the staff of most of the Government hospitals and dispensaries for the practice of midwifery among the people.


MAP SHOWING SEA PORTS
HAVING INTERNATIONAL TRAFFIC AND AIR PORTS
ON THE MAIN TRANSCONTINENTAL AIR ROUTE
IN BRITISH INDIA AND INDIAN STATES
(1940)
KASHMIR
N.W.F. PROV.
PUNJAB
BALUCHISTAN
RAJPUTANA
SIND
UNITED PROVINCES
CENTRAL INDIA
BIHAR
BENGAL
ASSAM
BURMA
CENTRAL PROVINCES
EASTERN STATES AGY.
ORISSA
HYDERABAD
MYSORE
BOMBAY
MADRAS
Delhi
Jodhpur
Cawnpore
Allahabad
Madhavgarh
Rajamand
Karachi
Kandla
Jakhau
Mandvi
Okha
Dwarka
Porbander
Bhavnagar
Veraval
Kodinar
Mahuva
Bombay
Shrivardhan
Kumbharu
Rajpuri
Malwan
Vengurla
Goondapoor
Mukka
Hangarakotta
Malpe
Mangalore
Kasaragod
Cannanore
Tellicherry
Badagara
Calicut
Ponnani
Cochin
Allepey
Quilon
Kollthattam
Trivandrum
Colachel
Cuddalore
Porto Novo
Tirumalavasal
Negapatam
Tondi
Adirampatnam
Ammapatnam
Pamban
Dhanushkodi
Kilakarai
Tuticorin
Kulasekarapatnam
Puri
Gopalpur
Calingapatam
Bimlipatam
Vizagapatam
Cocanada
Masulipatam
Calcutta
Chittagong
INDEX.
Air ports
Sea ports
Sea and air ports

SECTION V.

PORT HEALTH ADMINISTRATION.

Introduction.

29. This section deals with the health administration of both seaports and airports. The administration of the seaports is governed by the Indian Port Health Rules which were revised and republished as recently as 1938. An important event in the year 1940 was the publication in June of the Indian Aircraft (Public Health) Rules. The section of these rules which deals with the prevention of the entry of yellow fever into India by aeroplanes had been in existence since 1936 as emergency regulations. At first the Aircraft Companies were inclined to regard these regulations as troublesome, but the experience of the last five years has shown how necessary they are and they are now working smoothly.

The prevalence of infectious diseases in ports.

30. Cholera, smallpox and plague continued to be present in some part or other of the country throughout the year and for that reason an efficient quarantine organisation in Indian ports is essential, if the health authorities of other countries are to be assured that adequate control is being exercised against the export of these infections. That the measures in force at the ports with foreign traffic were efficiently carried out in 1940 is proved by the small number of cases of infectious disease which developed on ships after they left India. A careful examination is made of all passengers and crew leaving India and the results of these examinations are given in the notes relating to individual ports. Brief notes on the incidence of cholera, smallpox and plague in the seaports and airports of British India are given below.

As regards cholera fourteen seaports with international traffic were infected during 1940 as well as three airports on the transcontinental air route. The figures for attacks and deaths at each of these ports are as follows :—

Name of the port.	Cholera.	
	Attacks.	Deaths.
Seaports—		
Calcutta	2,556	588
Puri	165	21
Cocanada	103	33
Karachi	59	29

	Cholera.	
	Attacks.	Deaths.
Calingapatam	59	17
Vizagapatam	19	13
Masulipatam	14	5
Chittagong	12	9
Bimlipatam	10	6
Bombay	9	6
Cuddalore	2	1
Madras	1	..
Porto Novo	1	..
Kasargod	1	..
Airports—		
Cawnpore	664	228
Allahabad	18	13
Delhi	6	5
	3,699	974

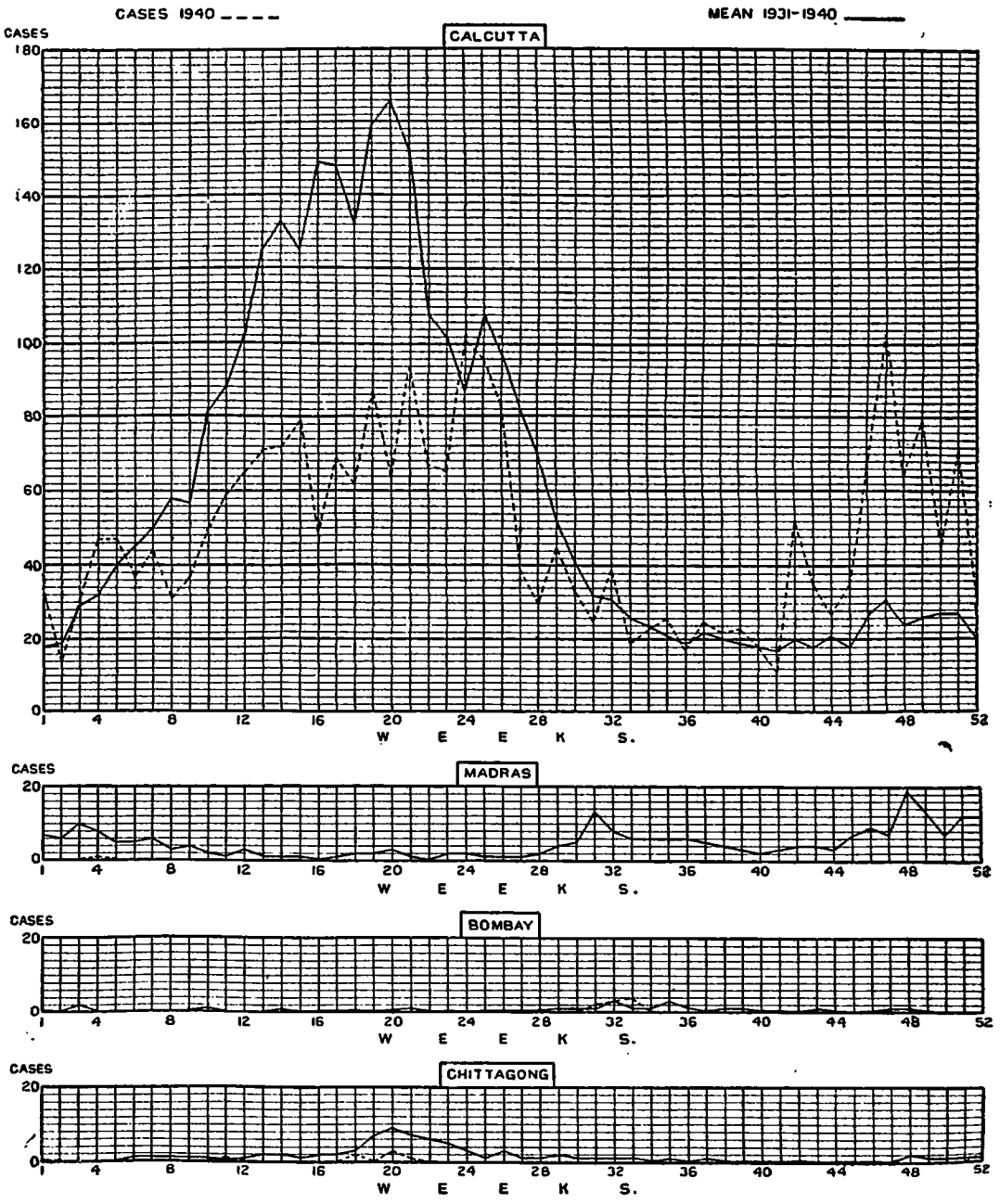
It will be seen that Calcutta had the highest incidence of cholera among the seaport towns. The infection in this city was distributed throughout the year, the monthly figures ranging from 87 attacks in September to 295 in November.

In Cawnpore, the town with the highest figures among airports, the epidemic of cholera started at the close of the first quarter of the year and a few cases a week continued to occur till the end of July. The height of the epidemic was reached when 184 attacks were recorded in the third week of August. The epidemic ceased by the middle of October except for three sporadic cases in the third and fourth weeks of November.

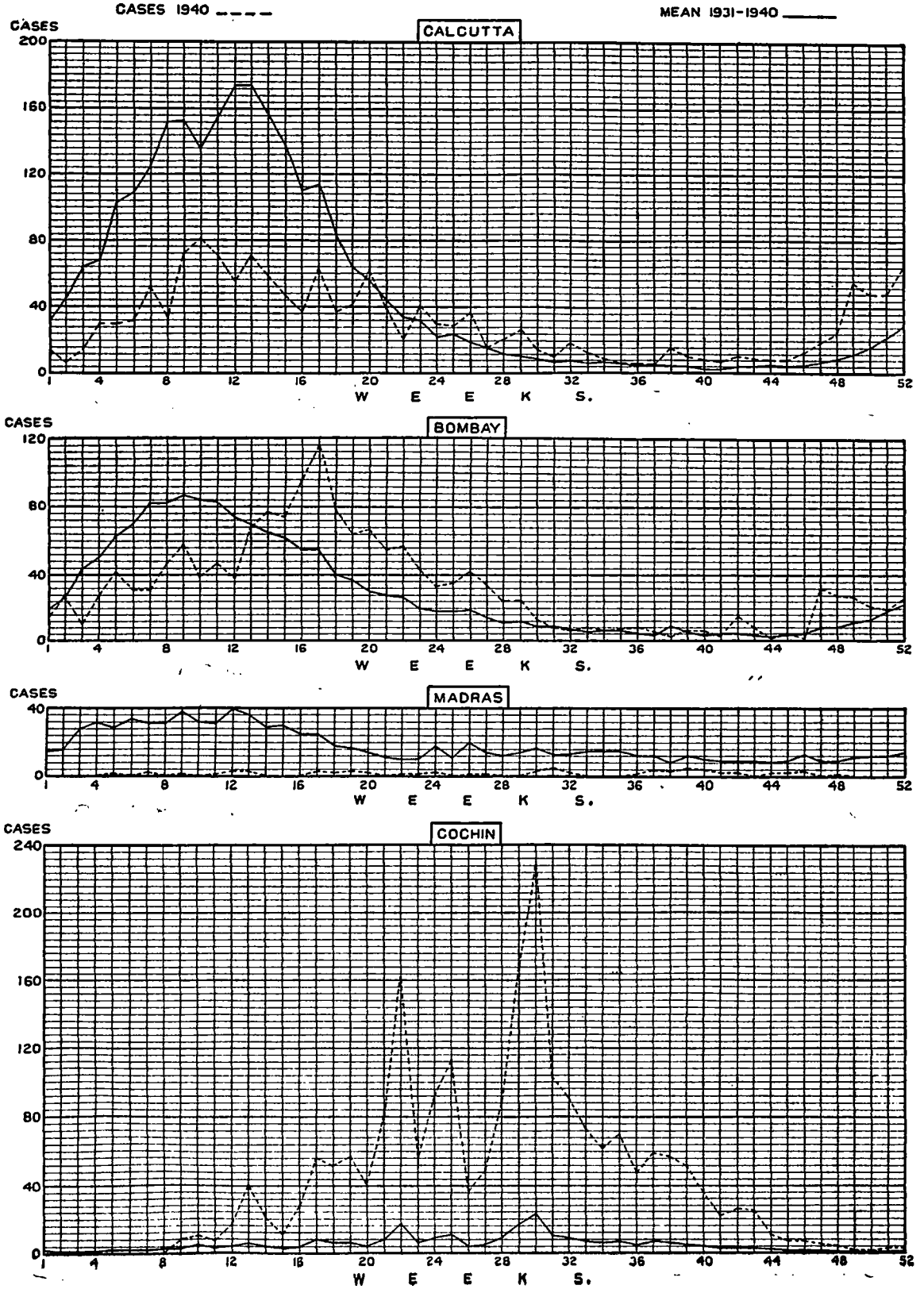
Of the seaports with international traffic seven are classed as major ports. These are Chittagong, Calcutta, Vizagapatam, Madras, Cochin, Bombay and Karachi. In the diagram facing this page graphs are given showing the incidence of cholera in four of these ports during 1940 and the mean incidence of the disease during the ten year period, 1931—1940. In the remaining three major ports the incidence of the disease was relatively insignificant and graphs are therefore not given. It will be seen that Calcutta has easily the highest mean incidence of the disease. The average prevalence of cholera in the other three towns is insignificant in relation to that of Calcutta.

The number of seaport towns which reported smallpox during 1940 was 18. Of these Cochin, Bombay and Calcutta had a high incidence of the disease with 2,092, 1,730 and 1,570 attacks and 791, 834 and 1,098 deaths respectively. In three more towns, Cannanore, Negapatam and Karachi the numbers of smallpox attacks were between 100 and 200 while in the remaining towns the

WEEKLY DISTRIBUTION OF CHOLERA CASES IN CERTAIN SEAPORT TOWNS IN BRITISH INDIA



WEEKLY DISTRIBUTION OF SMALLPOX CASES IN CERTAIN SEAPORT TOWNS IN BRITISH INDIA



numbers of attacks were less than 100. All the infected airports had a relatively high incidence. The figures for individual ports are shown below :—

Name of the port.	Smallpox. Attacks.	Deaths.
Seaports—		
Cochin	2,092	791
Bombay	1,730	834
Calcutta	1,570	1,098
Cannanore	168	28
Negapatam	147	72
Karachi	105	21
Madras	98	31
Calicut	44	11
Masulipatam	34	9
Tellicherry	20	3
Puri	14	4
Malwan	11	3
Cuddalore	11	3
Vengurla	5	2
Cocanada	3	..
Vizagapatam	1	..
Addiramapatnam	1	..
Mangalore	1	..
Airports—		
Cawnpore	374	234
Delhi	187	150
Allahabad	76	65
Jodhpur	Not available.	301
	6,692	3,660

Graphs representing the incidence of smallpox in some of these ports during 1940 and the mean incidence of the disease during the ten year period, 1931—1940, are given in the diagram facing this page. The curves for average incidence show that, in Calcutta, Bombay and Madras, the height of the epidemic is reached in the early months of the year. In Cochin, on the other hand, smallpox incidence is low at the beginning and at the end of the year while, during the intervening months, the disease is fairly evenly distributed.

None of the seaports in the Indian States reported cases of cholera. The figures of attacks and deaths from smallpox reported from certain ports in different Indian States are shown below :—

Name of the State.	Name of the port.	Smallpox. Attacks.	Deaths.
Bhavnagar	Bhavnagar	6	6
Junagadh	Veraval	69	13
Baroda	Kodinar	26	6
Baroda	Dwarka	20	4
Travancore	Alleppey	74	27
Kutch	Mandvi	4	4
Kutch	Kandla	1	..
Porbandar	Porbandar	306	157

As regards plague infection, human cases were reported only from three ports, Alleppey, Cochin and Calicut. Alleppey had four fatal cases during the year while Cochin and Calicut recorded one fatal case each. Plague infection in rats was reported only from the ports of Alleppey and Cochin.

Control of plague infection in rats is a very important measure in ports in order to prevent the export of infection to foreign countries. In most of the important ports in British India a continuous campaign against rats is being carried out and the rats caught are examined for signs of plague infection. In Bombay, Karachi and Calcutta facilities are available for the deratisation of ships, and certificates of deratisation or of exemption from deratisation are issued by the Port Health Officer.

To give some idea of the extent of these operations the following figures are quoted with respect to the three major ports of Bombay, Karachi and Calcutta. During the year 691,223 rats were caught and destroyed in Bombay city and 13,032 in the port area. All the rats caught in the port area and about 32 per cent of those caught in the town were examined. No case of plague infection was detected. The number of ships which were deratised and granted deratisation certificates was 38 while the number of ships that qualified for deratisation exemption certificates was 54. In addition, 142 country craft were granted deratisation certificates after fumigation and 3,799 country craft were granted deratisation exemption certificates.

In Karachi, the number of rats caught and destroyed in the port area was 5,142 of which 44 were examined and none found to be infected with plague. Seven ships were deratised and granted certificates. Exemption certificates were granted for 16 ships. On board ships the total number of rats destroyed was 494.

In Calcutta the number of rats caught and destroyed in the port area was 4,896. Of these 2,135 were examined and none was found to be infected with plague. Seventyfive ships were deratised and given certificates. Deratisation exemption certificates were granted to 107 ships. The number of rats caught and destroyed on board ships was 1,316. One hundred and sixtyfour rats were examined and none was found infected with plague.

Port of Bombay.

31. Fourteen ships were found to have had cases of infectious diseases on board at the time of arrival or during the voyage. In these vessels there were on arrival 42 cases of chickenpox and one case of cerebro-spinal meningitis. Two of these vessels with onward bound passengers and with 13 cases of chickenpox were allowed to continue their journey and the cases were not removed from the ship. The bills of health were, however, endorsed to the effect that chickenpox had occurred and that measures to prevent its spread on board, with possible introduction of infection into other ports, had been taken prior to the departure of the vessels. On board a cargo vessel there occurred a non-fatal case of measles.

No coastal vessel arrived in quarantine during the year. The infected parts of 11 vessels from foreign ports which came in quarantine were disinfected on arrival. No measures enforcing isolation, observation or surveillance of

cases of infectious disease were imposed during the year. The infectious cases which landed in Bombay together with their contacts were sent to the infectious diseases hospital for disposal.

Vessels leaving for foreign ports were inspected before departure and five passengers and two members of crew were not allowed to sail as four of them were found to be suffering from chickenpox and the fifth from smallpox. Eight contacts of these cases were also prevented from sailing. In addition to the above, eight cases of undiagnosed fevers with ten contacts, two of measles with two contacts, and four of scabies with two contacts were rejected by the ships' surgeons, these cases having been brought to their attention at the time of medical inspection by the port health staff.

The infected parts of two passenger vessels, on which there were cases of infectious disease among the onward bound passengers, were disinfected prior to the departure of the vessels from Bombay.

Among the vessels lying in the harbour there occurred during the year three cases of chickenpox on three different vessels. The bedding and clothing belonging to 67 members of the crew on these vessels were disinfected.

Measures to prevent ingress of rats into vessels were taken by the Bombay Port Trust and a certificate was furnished to the Port Health Department by the Docks Manager of the Port Trust.

Two hundred and sixtyfive inspections were carried out in connection with the supervision of provisions for lascars on board ships. Seven samples of ghee and seven of lime juice were submitted for examination. Of these two samples of ghee and six of lime juice were condemned by the Chemical Examiner to the Controller of Customs, Bombay, and they were replaced. Margarine to the extent of 2,016 lbs. was also rejected and replaced.

The pilgrim traffic from this port does not correspond strictly to the calendar year. Pilgrims started leaving Bombay during the period from December 1939 to January 1940 and 3,768 pilgrims went on the Haj pilgrimage. Before embarkation all pilgrims had been vaccinated against smallpox and inoculated against cholera. Eight vessels brought back the pilgrims, who numbered 3,268. Of these vessels four came back infected with chickenpox. The necessary precautionary measures were taken.

The sanitation of the port area is looked after by a staff employed by the Bombay Port Trust under the supervision of a medical officer employed by that organisation. Antirat and antimosquito measures were also undertaken by the staff of the Bombay Port Trust, acting under the orders of the same officer. It is reported that adequate attention was paid to both these measures of prevention. Water was supplied to shipping from the municipal water supply. The water boats which were in use were periodically cleaned out.

Port of Karachi.

32. Seven ships arrived in this port infected, four with chickenpox, one with smallpox and two with cases of smallpox and chickenpox. All the necessary precautionary measures were taken on each occasion.

All the vessels which departed for foreign ports were inspected. No passenger or member of the crew was prevented from sailing during the year on account of infectious disease, nor was there any case of infectious disease on the vessels while they were in the harbour.

Provisions for the use of Asiatic crew were inspected on 13 ships and eleven samples of ghee were sent for analysis. Of these one was reported to be unfit for human consumption.

The outward pilgrim traffic began on the 7th December 1939 and ended on the 5th January 1940. Five pilgrim ships sailed from Karachi during this period. They arrived with pilgrims on board from Bombay and after embarking additional pilgrims sailed for Jeddah. The total number of pilgrims from Karachi was 2,875 which was smaller than usual owing to the abnormal conditions resulting from the war. Returning pilgrims were brought back in eight ships and 3,727 disembarked at Karachi. It is reported that the total number of deaths during the voyage on incoming pilgrim ships was 24 and that all were cases of non-infectious disease. Immunisation against smallpox and cholera of all the pilgrims was carried out before embarkation. It is reported that cases of cholera did not occur among the pilgrims and the number of smallpox cases on board the ships among the returning pilgrims was as small as six.

Antimosquito measures in the harbour area and the adjoining Karachi Port Trust Estates were carried out throughout the year under the supervision of the Port Health Officer by the staff maintained for this purpose by the Karachi Port Trust. It is stated that the whole area is divided into six parts and that each part is inspected one day in the week. In addition, all the newly arrived country craft are boarded and inspected for mosquito breeding. Further, country craft remaining in the harbour for more than 10 days are inspected again. It is stated that breeding of mosquitoes in the land area is insignificant and that the main source of stegomyia breeding is the country craft. Country craft with iron tanks appear to be less favourable to the breeding of mosquitoes than those with wooden tanks. It is stated that the number of country craft with iron tanks has been steadily increasing. The measures that are being carried out have had evidently a considerable effect as will be seen from the steady decrease in the stegomyia index of country craft and fishing boats during the past four years.

Stegomyia Index.

Year.	Country craft.	Fishing boats.
1937	28·36	13·07
1938	18·36	7·05
1939	15·95	5·36
1940	10·31	3·27

The Port Health Officer points out that the provision of an approved pattern of water tank preferably made of iron, fitted with mosquito proofed cover and tap, would be the ideal to aim at from the point of view of eliminating the breeding of mosquitoes.

Water supply to ships is from the municipal mains. Ships are supplied with water from the Karachi Port Trust water main running along the wharf.

Karachi Marine Airport.

33. The Marine airport is situated at a distance of about 2½ miles from the inhabited area of the city. There are no residential buildings in the vicinity. This airport is fully equipped from the point of view of health administration. In the administrative building of the marine airport an efficient mosquito proofed isolation room has been reserved for the temporary segregation of yellow fever cases or suspects, pending their removal to the yellow fever isolation hospital at Drigh Road. There is also in the administrative building a room for the medical inspection of the passengers and crew of outgoing and incoming flying boats.

During 1940 the number of persons who arrived from yellow fever infected areas within nine days of their leaving such areas was 243 members of crew and 13 passengers. Of these, 234 members of crew and 10 passengers had been protected by inoculation against yellow fever and the remaining persons were unprotected. The inoculated persons were allowed to enter without restrictions, while the unprotected persons were isolated at Drigh Road until nine days had elapsed since they had left the yellow fever infected areas.

All flying boats coming from yellow fever areas had already been disinsectised by the health authorities at Khartoum or Cairo. Those flying boats which brought in the uninoculated persons from a yellow fever area were immediately disinsectised at Karachi.

All eastbound flying boats were inspected on arrival and all westbound flying boats before departure. In view of the fact that the Karachi marine airport is the port of entry for all flying boats coming into India from the west, vigorous antimosquito measures were carried out in and around the vicinity of the airport and in the whole of the harbour area. These measures have already been described in a previous paragraph relating to Karachi seaport.

The sanitation of the marine airport is reported to be satisfactory, the conservancy work being carried out on behalf of the Karachi Port Trust by the Karachi Corporation. The water supply is from the Karachi municipal water works.

Karachi Airport.

34. The general sanitation of the area is reported to have been satisfactory during the year. Steps were taken to remove certain defects in the sewage farm.

Antimosquito measures included the regular supervision of springs, the filling up of a large number of burrow pits left over by the contractors during the construction of temporary military camps, the closing of a number of new wells dug in various places by the villagers and the regular treating of other wells with petrol. Little progress was made during the year in the filling of burrow pits in the North Western Railway area as the railway authorities were busy with other programmes of work. These pits were, however, regularly oiled in order to prevent mosquito breeding. Wherever the draining of water was not practicable, the pools were treated with malariol.

Good results are reported from the fumigation of village huts. Fumigation was also carried out in all residential buildings of the airport.

The mosquito index remained lower in 1940 although the rainfall was three times as much as during the previous year.

No outbreak of any epidemic disease took place during the year under review. The residents of the airport colony and of the adjoining villages were inoculated against cholera when the disease broke out in Karachi city.

The health authorities at Alexandria and Khartoum cabled advance information in respect of passengers leaving yellow fever infected areas for India. During the year 12 persons, who landed at Karachi within nine days of having left a yellow fever infected area, were placed in quarantine in the isolation hospital.

Certificates of health were given to all westbound aircraft.

Port of Calcutta.

35. Eight infected vessels arrived at this port during the year. Of these three ships were infected with chickenpox, two with smallpox, two with cholera and one with diphtheria. All necessary preventive measures were taken in each case.

At the medical inspection of outgoing ships 59 passengers, seven members of the crew and 38 contacts were prevented from sailing on account of infectious disease. Fifteen passengers suffering from fever, three from mumps and one from measles were also rejected by the ships' surgeons, to whose attention these cases had been brought at the time of medical inspection by the Port Health Department.

Disinfection of infected parts of outgoing vessels was carried out when necessary.

Two cases of cholera and three of chickenpox occurred on five vessels lying in this port. All the necessary precautionary measures were taken on each occasion.

In order to prevent the ingress of rats into vessels lying in the harbour the fumigation inspector continued to enforce the measures designed to prevent the ingress of rats into vessels. It is stated that these inspections have proved a success and that masters of vessels cooperated in carrying out the prescribed measures.

In accordance with Rule 61 of the Indian Port Health Rules, 1938, 75 deratisation certificates and 107 deratisation exemption certificates were issued by the Port Health Officer during 1940 as compared with 77 deratisation certificates and 66 deratisation exemption certificates in 1939.

The provisions for the crew on board ships were inspected during the year. Thirtysix samples of ghee and one of mustard oil were sent to the Bengal Public Health Laboratory for analysis. Ten of the samples of ghee were reported to be adulterated. Both the masters and the agents of the vessels concerned were made to replace the unwholesome stock by genuine ghee.

Only one pilgrim ship sailed from the port of Calcutta during the year 1940. She left for Jeddah on the 30th November 1940 and carried 1,312 pilgrims all of whom were medically inspected before going on board. All pilgrims had been vaccinated against smallpox and inoculated against cholera.

Sanitary arrangements were made as usual in Calcutta for the pilgrims to the Ganga Saugor *mela* held in January 1940. No death took place among the pilgrims on any vessel on the journey down or on the journey back to Calcutta.

Special attention was paid during the year to the sanitary condition prevailing on the vessels in the port, the cleanliness of sleeping quarters, mess rooms and food stores being particularly stressed. Supervision of the sanitation of the port area was carried out by the sanitary staff employed by the Port Health Commissioners. The Port Health Department took a keen interest in the work and brought to the notice of the Port Commissioners all existing nuisances for necessary action.

Antimosquito measures were in operation on shore and on vessels. On shore these measures were carried out by the Garden Reach Antimalaria Association staff on behalf of the Calcutta Port Commissioners. The Port Health Department undertook a special *Aedes* survey on all types of vessels entering the port. It was shown that stegomyia breeding was extensive on these vessels. Taking all classes of vessels into consideration, the *Aedes* index was shown to be 16·6 per cent. The indices of different classes of vessels were as follows :—

	Aedes Index per cent. (Monthly average.)
Seagoing vessels	1·4
Class 'A' barges	17·5
Inland steam vessels	15·2
Launches	4·6
Country boats	17·9

Mosquito control measures on these vessels included daily inspection, emptying of bilge water wherever necessary, the issue of strict instructions that all drinking water tanks in use should be effectively closed and the adoption of the Bombay pattern of mosquito-proof cover and tap for drinking water receptacles on class "A" barges.

Municipal filtered water was supplied to the shipping. Samples from all the shore hydrants as well as from all water barges and boats used in the port were collected twice monthly and sent for bacteriological analysis. The cleansing, lime washing, chlorination and refilling of the water containers in the boats with fresh supplies were systematically carried out on every occasion when an adverse laboratory report was received. It is stated that a weekly inspection of all water boats was carried out and that no complaint about the drinking water supplies to them was received during the year from any of the vessels.

Calcutta Marine Airport.

36. At the Marine Airport which is located at Bally Bridge within the limits of the Port of Calcutta, inspection of seaplanes was carried out by the

Port Health Officer and his staff. Facilities exist for the conveyance of cases of infectious disease by motor ambulance to the Campbell Hospital in Calcutta. In order to meet emergencies first aid equipment is maintained at the airport. Eastbound seaplanes at the time of departure and westbound seaplanes at the time of arrival were inspected during the year. No case of infectious disease was discovered among the crew or passengers of the seaplanes inspected during the year.

Dum Dum Aerodrome.

37. The aerodrome area consists of two parts, the newly built area and the area consisting of the old hanger and a few quarters. The new area has been fitted with water carriage system and the sewage is treated in a septic tank. The construction of a new incinerator for the disposal of house refuse has been sanctioned.

A mosquito survey of the area has been in progress. Breeding of mosquitoes was found to exist in most of the water collections around the aerodrome area practically throughout the year. Adult mosquitoes were caught at 25 catching stations. The *Aedes* index of the aerodrome proper has been reduced to zero. A survey was made of large collections of water around the aerodrome for ascertaining the varieties of larvicidal fish that are present and among the different species found, *Panchax panchax*, it is reported, is effective against larvæ.

All the buildings of the area were sprayed once a week to kill adult mosquitoes. For antilarval work malariol and paris green were used. Proper surface drains have been constructed by the Public Works Department and these will no doubt help to drain away the surface area and thus contribute to the success of the mosquito control measures. In the villages and schools around the aerodrome area 335 children below 12 years of age were examined for enlargement of spleen. The splenic index was shown to be 11·04 per cent.

All those who worked or resided at the aerodrome and who were not able to produce evidence of having been vaccinated during the previous three years were instructed to get themselves vaccinated. Altogether 270 persons were vaccinated during the year.

The health of the passengers and crew on the incoming and outgoing aeroplanes was satisfactory during the year. No case of infectious disease was discovered among them. The general health of the aerodrome personnel was also satisfactory. Three cases of infectious disease occurred during the year among them, of which two were cases of chickenpox and one an imported case of smallpox.

Eastbound aeroplanes at the time of departure and westbound aeroplanes at the time of arrival were inspected during the year. No necessity arose for carrying out disinfection on any of these aircraft.

Fifteen samples of water from different sources were sent to the Director, All-India Institute of Hygiene and Public Health, for bacteriological analysis and two samples for chemical analysis. The water samples from the reservoir

near the old hanger were found to be bacteriologically unsatisfactory while those from the tube-well were reported to be satisfactory. The aerodrome officer was advised to instruct all concerned not to use the water of the reservoir near the old hanger without boiling.

Port of Madras.

38. No deaths from infectious disease were reported on incoming vessels during the year. The infected parts of two vessels and the effects of passengers and crew were disinfected.

Three members of the crew of ships leaving for foreign ports were not allowed to sail as they were found to be suffering from chickenpox. In addition, four cases of undiagnosed fevers among the passengers were rejected by ships' surgeons. The infected parts of three vessels and the effects of the crew were disinfected.

Three cases of chickenpox were reported on vessels lying in harbour.

The inspection of provisions for lascar crew was carried out by the Port Health Department. Fiftysix inspections were made during the year and four samples of ghee were sent for analysis. Of these samples one was condemned and the consignment from which it was taken was replaced. Other provisions were found to be good in quality and sufficient in quantity.

It is reported that the sanitation of the port area was maintained satisfactorily by the Madras Port Trust.

The Port Trust employs one overseer and two lascars and the requisitenumber of subordinate staff for antimosquito work. All places which are likely to breed mosquitoes in the harbour area are examined once a week and, during the rainy season, special measures are taken to drain away, as far as practicable, all collections of water. It is stated that, since the antimosquito campaign was started, the nuisance has considerably abated. The mosquito index during the year ranged between 0·2 and 1·4.

At the request of the Traffic Manager, Madras Port Trust, the Port Health Department inspected 31 consignments of foodstuffs and a number of articles were condemned as unfit for human consumption.

The water supply for shipping and for other purposes in the port area was obtained from the Corporation of Madras. Vessels at East quay and moorings were supplied with water by water barges. These barges were kept in sanitary condition.

Port of Chittagong.

39. Three infected vessels arrived at this port during the year. The cause of infection in respect of two vessels was chickenpox and of the third smallpox. The necessary precautionary measures were taken by the Port Health Department. Twelve European and 24 Asiatic seamen were treated in hospital for various illnesses.

Measures for the destruction of rats were carried out on a small scale. Rats were caught and killed every week from the port area by using traps. No case of plague infection was discovered among these rats.

Antimosquito measures included the cleansing of bilges and fumigation of the holds of ships for the purpose of keeping down the mosquito population. Stagnant collections of water in the jetty area of the Assam Bengal Railway were treated with kerosene oil to prevent the breeding of mosquitoes and the drainage of this area was also improved during the year.

The medical supplies of 14 ships and the provisions for lascars in 21 ships were inspected. Three tins of ghee, three of sardines and one bag of dried fish were condemned and replaced. Articles of food meant for sale by licensed vendors to passengers on ships were also inspected and found to be satisfactory. Filtered water was supplied to the shipping from the Chittagong Municipal Water Works and by the Assam Bengal Railway. No complaints were received during the year regarding its quality and quantity.

Port of Vizagapatam.

40. Only one case of infectious disease occurred on the vessels arriving in the port, this being a case of chickenpox. He was landed, segregated and treated at the municipal isolation hospital. Thirtysix members of the crew of a cargo vessel were revaccinated.

The provisions and drugs on board vessels were examined in respect of two cargo and three passenger ships. It is reported that in all cases the supplies were up to the required standards of purity.

The extent of the port area under sanitary control was about 200 acres. It is reported that the sanitation of the place was satisfactory during the year. A rat campaign was maintained throughout the year and the number of rats caught and examined was 382. No case of plague infection was discovered among these rats.

Antimosquito measures were carried out over an area of about 2,160 acres, of which about 1,430 acres were under the influence of tides. The area was divided into eight districts and each district received antilarval treatment once or twice a week as was found necessary. Paris green and a mixture of crude oil and cresol were used as larvicides.

The sources of water supply to the port are from underground springs, the water being collected through infiltration galleries. The quality of the water is reported to be satisfactory even without chlorination.

SECTION VI.

HEALTH ADMINISTRATION ON INDIAN RAILWAYS.

Introduction.

41 The Indian railway administrations constitute the largest employers of labour in India, just over seven hundred thousand persons having been employed during the year 1938-39. The health services for this population are maintained at a high level of efficiency. Clear evidence of this is given by the fact that, in spite of the wide prevalence of the common infectious diseases such as cholera, smallpox and plague among the general population, their incidence among the railway employees and their dependents who live in railway premises is very low. The position in regard to malaria differs however from that of the diseases mentioned above. It is extensively prevalent in many areas through which the railway lines pass and the railway population has also been subject to malaria in such areas. However, the reports of the Chief Medical Officers of the railways show that the gravity of the malaria problem has been fully recognised and that preventive measures are actively being carried out.

In addition to the provision of medical relief, the medical departments of the railways are carrying out a large amount of preventive health work. These include the general sanitation of the railway colonies, of the stations and of railway carriages, control over water and food supplies, antimalaria measures, maternity and child welfare work and the training of the railway staff in first aid, home nursing and ambulance work. A welcome feature of recent years has been the increasing collaboration between the railway, the civil and the military health authorities, through the establishment of local committees, in the investigation of common problems with a view to taking appropriate action for their solution. Another direction in which valuable results have followed from the cooperation of the railway and civil health authorities is in respect of the measures necessary for safeguarding the health of the pilgrims attending large fairs and festivals. Some of these festivals are attended by several hundreds of thousands of pilgrims, who come from all parts of India, and it is only with the fullest coordination of effort between the railway and civil health staffs that the comforts of the travelling pilgrims can be catered for and, what is equally important, that the danger of outbreaks of infectious disease, particularly cholera, can be averted.

In the following paragraphs are briefly described the activities of the railway health departments under these different heads. The administration reports of the health departments of Indian railways have been compiled in the past for the official year and it has not therefore been possible to obtain figures relating to the calendar year 1940. The figures given in the following paragraphs relate to the year 1939-40.

North Western Railway.

42. The cases treated by the railway medical staff included sixteen of cholera, 93,683 malaria, 57,704 injuries, 14,698 trachoma, 9,670 dysentery, 317 smallpox and 801 enteric fever. It is stated that 226 persons including employees and members of their families, were given antirabic treatment. During the year medical and sanitary arrangements were made by the railway administration in connection with 20 different festivals.

No separate organisation exists for antimalaria work. Cleaning and oiling of drains, drainage of stagnant pools, filling up of small pits and depressions and similar activities were carried out by the engineering branch in cooperation with the medical branch. Spraying of selected quarters with Pyrocide 20 was continued and valuable results are stated to have been obtained. Fortyone classes in first aid and three in home nursing were held during the year. A total of 778 candidates was trained in first aid and 18 in home nursing. Eight child welfare centres were maintained at different places on the railway. The total expenditure of Rs. 23,800 was met from the Railway Staff Benefit Fund. In addition this fund made grants towards the cost of spectacles supplied to employees of the railway drawing Rs. 30 or less.

Bombay, Baroda and Central India Railway.

43. The number of employees treated for allcauses of illness during 1939-40 was 187,577 as against 191,024 during the previous year. Of these 268 were treated for enteric and 13,609 for influenza. There was only one case of cholera during the year and it proved fatal. Plague was absent and 260 cases of smallpox occurred among the railway employees and their dependents.

Six qualified dentists were given facilities for working in the hospitals and dispensaries of the railway. They were allowed free passes for themselves, their dental kit and servants in return for free treatment to menials and treatment to others on reduced fees. In all 1,672 cases were treated, of whom 609 cases were treated free.

Antirabic treatment was given to 205 patients. Antimosquito measures were carried out in 25 stations. Primary and recrudescent cases of malaria among the employees of the railway during the year were 11,266 and 5,716 respectively as against 8,512 and 8,693 during the previous year. There was thus an appreciable increase in primary infections. This is reported to have been due to a severe malaria epidemic in Bombay district during the latter part of the year.

An intensive drive for the abolition of sumps in railway areas was made during the year, the sullage and waste water being run into oleander plantation beds. It is reported that this method of treatment has been shown to be satisfactory. The disposal of nightsoil by the Indore process was also tried in a number of stations. The end product is stated to be of good quality as manure and to have secured a growing demand amongst agriculturists.

Fortyfour classes in first aid were held during the year as against 39 during the previous year, and of the 536 persons who underwent training 322 received certificates. Two classes in the Mackenzie course for school children, three in home nursing and one in junior first aid were also held.

Madras and Southern Mahratta Railway.

44. The Chief Medical Officer states that the major epidemic diseases, namely cholera, smallpox and plague, had only a very low incidence among the rail way population. It is also stated that the majority of the cases occurred among the employees and their dependents living outside railway premises. It is claimed taht the prompt preventive measures taken by the railway health staff are largely responsible for these results. For instance, it is pointed out that, while in Madras Presidency there occurred during the year an increase of about 15 per cent in the incidence of smallpox, only 34 railway employees contracted the disease and, of these, 32 cases occurred among those living outside the railway premises. Plague claimed three attacks among the employees and six among their dependents. The corresponding figures for cholera were two and six respectively. Among the affected population 1,457 inoculations against cholera and 2,275 against plague were carried out and the numbers of primary and revaccinations against smallpox totalled 5,546.

As regards malaria the position is different. Its incidence was high in the railway colonies at Guntakal, Dronachellam and Gooty and among the engineering gangmen resident in the neighbouring villages of these areas. It is stated that all possible steps were taken to control its prevalence, including antimosquito measures in and around the railway colonies. As effective control measures cannot be carried out without the cooperation of the civil health authorities, it is stated that meetings took place between the railway and civil health staffs for the purpose of developing joint action against the disease.

The railway administration has been carrying on an active antimalaria campaign for a number of years and it is pointed out that, during 1939-40, such measures were in operation at 45 stations. The Chief Medical Officer has given an interesting table in his report showing the results achieved by the antimalaria campaign. Figures for the numbers of malaria cases treated and the numbers of days lost by the employees on account of malaria in the year prior to the commencement of antimalaria measures and during 1939-40 are given for eleven stations. In every station there has occurred a considerable reduction in the incidence of the disease. The total number of malaria cases treated during 1939-40 in these eleven stations was 720 as against 6,662 before antimalaria operations started. The number of days lost by the railway staff on account of malaria during 1939-40 was 2,366 as against 8,111 before the adoption of preventive measures. In regard to the splenic index remarkable reductions have been recorded in these places. In one station, Mamanduru, the spleen index was reduced during the period from 33·3 per cent to 0·0 per cent.

It is reported that the system of medical examination of railway school children and the maintenance of medical records continued to work satisfactorily throughout the year. A grant of Rs. 100 was made from the Staff Benefit Fund for the free supply of spectacles to employees drawing Rs. 30 and less. In addition the payment of salaries and allowances to the midwives at three stations was also sanctioned from the Staff Benefit Fund.

As regards water supply it is reported that many improvements were carried out at Gooty, Nandyal, Tungabhadra, Nagarur, Majorda, Nandalur and Castle Rock.

An effort was made to train large numbers of volunteers in first aid and instruction in stretcher drill was added to the course. Revision classes were also conducted for first aiders who had qualified in past years.

South Indian Railway.

45. The number of employees treated during 1939-40 was 19,747 as against 16,281 during the previous year. Only one case of cholera took place. It occurred in the family of an employee residing within railway premises and the case proved fatal. No case of plague occurred during the year. On the other hand 62 cases of smallpox with eight deaths took place, of which 12 attacks and two deaths were among the employees and their families residing within railway premises. The general health of the railway population is stated to have been satisfactory during the year.

Antimalarial measures are stated to have been carried out in Shencottah Ghat section with a reduction in the incidence of the disease. Besides the usual measures, spraying of open spaces with Pyrocide 20 was also carried out. In the Salem-Morappur section of the railway spraying with Pyrocide 20 is stated to have reduced the incidence of malaria by 58·3 per cent.

Ninety cases of enteric fever were admitted into the Golden Rock hospital ; of these seven died. It is stated that this outbreak took place as the result of an extension of infection from an epidemic in Trichinopoly city.

There were no big festivals during the year. Adequate arrangements were made for minor festivals at certain places. The water supply on the railway is stated to be of good quality.

During the year 95 employees including seven officers passed the first aid examination. One First Aid Division for men is in the stage of formation and it is stated that two Nursing Divisions are also being formed.

All existing train accident boxes were overhauled and altogether 104 boxes were in use during the year.

Great Indian Peninsula Railway.

46. The total number of patients treated amongst the employees of the railway during the year 1939-40 was 133,456 and of their families 91,449. The corresponding figures for the previous year were 126,348 and 86,430. The increase is stated to have been due mainly to malaria and other fevers. The percentages of cases of malaria and of total ' fevers ' to the deaths from all causes during the past three years are given below :

Year.	Malaria.	Total fevers.
1937-38	6·9	31·9
1938-39	8·9	38·7
1939-40	12·6	45·2

The intermittent rainfall that took place during the year is stated to have been responsible for the high incidence of malaria. In addition to this disease influenza was also prevalent throughout the year and it reached its maximum incidence in the month of October. The number of cases of influenza reported was 8,709 with ten deaths as compared with 7,886 with four deaths in the previous year.

As regards cholera 17 cases with seven deaths were reported within the railway premises and six cases with one death outside the railway premises. The corresponding figures for 1938-39 were 122 and 53 within railway premises and 57 and 26 outside the railway premises. No case or death from plague occurred during 1939-40. On the other hand, the incidence of smallpox was high with 446 cases and 43 deaths within the railway premises and 404 cases with 12 deaths outside the railway premises, as compared with 126 and six within railway premises and 171 and seven outside the railway premises during the previous year.

The number of anticholera inoculations carried out in 1939-40 was 5,827 and of vaccination against smallpox 20,334. Antirabic treatment was given to 372 persons as against 360 during the previous year. The two maternity and child welfare centres at Bhusawal and Manmad continued to do good work and an additional centre was opened at Jhansi in August 1939. The expenditure on these centres was met from the Staff Benefit Fund. In addition, a grant of Rs. 200 per annum from the Staff Benefit Fund was sanctioned to the non-railway maternity home at Dhond on the condition that the families of railway employees were visited in their homes on payment of an agreed scale of fees. The Staff Benefit Fund also provided a sum of Rs. 3,043 for the supply of spectacles free of charge to employees drawing Rs. 30 or less per month.

Thirtyfour classes in first aid were held at 20 stations. First aid was rendered to 8,596 patients either in the railway workshops or on the open line by staff qualified for rendering first aid.

The Hazardous Occupation (Lead) Rules, 1937, are being enforced in respect of 64 employees working in Parel, Matunga and Wadi Bunder workshops. A systematic six-monthly medical examination of such employees was introduced in June 1938. Any workman found to be suffering from signs or symptoms of lead intoxication is declared unfit for the continuance of such work and placed under treatment. Those who are found particularly susceptible to lead poisoning are recommended for other occupations. In 1939-40, 111 persons were re-examined and all of them were found fit.

East Indian Railway.

47. The total number of persons treated on this railway including employees and their families was 504,245 as against 473,354 during the previous year. The increase is stated to have been mostly due to influenza. In consequence of an epidemic of smallpox in Bengal and Bihar it is stated that a number of cases occurred in the railway colonies at Bandel, Sahibganj, Jamalpur and Jhajha. All possible preventive measures were taken and the number of vaccinations performed was more than double that of the previous year. The number of cases of cholera was 146 among the railway employees. It is stated that preventive inoculation has been found to be effective in controlling the disease and that, where this is efficiently carried out, sporadic cases need cause no alarm. Antirabic treatment was given to 875 persons. The incidence of tuberculosis among the railway staff and their families is stated to have increased as compared with ten years ago. The cases seen are mostly pulmonary and cases of visceral, glandular and bone tuberculosis are stated to be rare

The antimalaria measures at Lillooah, Barwadih, the Doon and Terai sections and Tatanagar are reported to be continuing. While it is reported that excellent results have been achieved at Lillooah and Barwadih, the Chief Medical Officer considers that in the Doon and Terai sections similar success has not been attained.

The central laboratory at Allahabad is carrying out the examination of samples of water and articles of food as well as pathological and bacteriological examinations of clinical material sent from the different stations on the railway.

Eastern Bengal Railway.

48. During 1939-40 the total number of new cases treated at the railway hospitals and dispensaries was 197,250. There was a reduction of 3,062 cases compared with the figure for the previous year. Of the common infectious diseases there were 26 cases of cholera, of which 19 were among employees and seven among their dependents. Anticholera inoculation was carried out among the affected population, the total number being 3,520.

Owing to a sharp epidemic in Calcutta district the incidence of smallpox increased during the year under review ; the total number of cases was 45 among employees. The number of vaccinations performed during the year by the railway medical staff was 23,725.

Malaria is stated to be responsible for approximately 1/6th of the total loss on the Railway in sick-man-days, and it is also stated to be the greatest single factor in the invalidism of the staff. During 1939-40 the number of malaria cases treated was 10,073, a reduction of 3,109 cases as compared with that of the previous year. It is stated that the reduction in the incidence of this disease was particularly noticed in the Calcutta district. Malaria control measures, including those for the eradication of mosquitoes and prophylaxis against infection by regular administration of quinine, were carried out by the railway authorities at sixteen stations. At seventeen other stations antilarval measures were taken by the railway in conjunction with other public bodies such as municipalities, military cantonments and district boards. At seven other stations the prophylactic administration of quinine was alone carried out.

The Chief Medical Officer's report emphasises the value of antimalaria measures to the railway administration. It is stated that the withdrawal, for a period of six months between October 1939 and March 1940, of the antimalaria measures which had been in operation since 1928 in Rajbari, a highly malarious place, resulted in a loss of work amounting to the cash value of Rs. 4,500 apart from the additional expense involved in treating the patients. It is also stated that at the stations of Khulna and Siliguri, the cessation of control measures similarly caused an increase in the incidence of malaria.

The use of pyrethrum insecticide spray for killing adult mosquitoes was also tried but the experiment was not carried out on a sufficiently large scale to permit of any conclusions regarding its value being drawn.

During the year 106 new cases of tuberculosis were treated among the railway staff, an increase of 24 cases over the figure for the previous year.

Antirabic treatment was given to 168 persons during the year, and of those 54 were employees.

A scheme for the supply of filtered water at Kanchrapara was completed during the year under review. A total of 600,000 gallons a day is being supplied to the railway colony at this place. Weekly bacteriological examinations of samples of water are carried out by the bacteriological laboratory at Sealdah for maintaining the desirable standard of purity of the water supplies.

Bengal and North Western Railway.

49. Malaria is an important problem on this railway. It is stated that during the year nearly 50 per cent of the cases of illness were due to this disease. Of the total number of malaria cases nearly 60 per cent were relapses, which shows that treatment was not continued sufficiently long to effect a cure. To get the people to realise the necessity for persisting with the treatment is therefore essential in order to achieve success in the campaign against malaria.

It is stated that tuberculosis was responsible for about 17 per cent of the loss of working days in the railway. The incidence of the disease is stated to be higher among the clerical staff of the Traffic and Audit Departments owing to their sedentary habits and overcrowding in their homes.

Two outbreaks of cholera in railway quarters took place during the years one at Mokamehghat and the other at Gonda. In both cases infection was brought from outside and its spread was controlled by disinfection of the wells and inoculation of the people.

First aid classes were held at Gorakhpur, Benares Cantonment, Samastipur and Sonepur during the year 1939. Of the 88 candidates examined 63 passed the examination.

The railway maintains a maternity and child welfare centre, and it is stated that its work is steadily growing. Of the expectant mothers attending the centre 112 were admitted to hospital for confinement and 27 were confined at their homes. A number of abnormal cases were referred by the centre to the hospital and the Chief Medical Officer draws attention to the value of co-operation between the centre and the hospital in the treatment of serious cases.

Antirabic treatment was given to 22 cases during the year.

Assam Bengal Railway.

50. The total number of cases of illness treated during 1939-40 among railway servants was 101,883. Of these nearly 27 per cent were cases of malaria. Cholera cases totalled six among the employees and one among the dependents. There were eight cases of smallpox, all among dependents. Among other infectious diseases enteric fever accounted for 44 cases among the employees and 43 among the dependents.

The number of inoculations against cholera and against enteric fever were 1,014 and 2,853 respectively, while vaccinations against smallpox totalled 4,069. Fiftyeight cases of kala-azar were treated in the different medical institutions maintained by the railway.

A midwife was maintained out of the Staff Benefit Fund at each of the stations of Pahartali, Lumding and Badarpur. These midwives carried out 66, 45 and 39 confinements respectively.

Bengal Nagpur Railway.

51. As the result of a recent reorganisation all the sanitary inspectors were placed under the direct control of the Chief Medical Officer. It is stated that considerable efforts have been made during the past two years at Bilaspur, Adra and Waltair to improve sanitary conditions. During the year under review 53 septic tank latrines were provided for staff quarters and 21 public latrines of this type were also constructed. Since 1932, when the construction of this type of latrine was started, the total number of private and public septic tank latrines has arisen to 163 and 80 respectively. Examination of the sewage effluents of these septic tanks has been started for the purpose of keeping a record of their performance.

A survey has been carried out of the drinking water supplies of all the important railway stations and full records regarding these supplies are being kept in the office of the Chief Medical Officer. During the year 155 samples of drinking water were examined. Common problems regarding water supplies were discussed by the Directors of Public Health of Madras and of the Central Provinces and the Chief Medical Officer.

Frequent inspections of the different stations are undertaken by the Chief Medical Officer in order to improve the standard of sanitation. Small stations, which cannot afford to maintain a sanitary inspector, are under the charge of specially trained conservancy supervisors. During the year 19 candidates received training and 12 passed the examination. In August 1939 all the railway public health staff and antimalaria inspectors were brought together for a conference at headquarters. At this conference the scope and functions of the public health organisation were explained to them. Book clubs are maintained by the Chief Medical Officer and the Malariologist of the Railway and public health and malaria inspectors who are all members of these clubs, are supplied with books and journals to keep them in touch with current practice in their respective spheres of work.

Malaria was present in epidemic form. Antilarval measures were carried out in many stations. Weekly doses of quinine and tubes of antimosquito cream for application to the exposed parts of the body were distributed to the running staff.

At Bhadrak malaria control continued to function well. A comparison of the average incidence of malaria in this station during a period of five years before preventive measures were started with the corresponding figures for six years of control shows that there has been an appreciable financial gain to the administration. In Khurda Road the staff were given prophylactic

quinine from September onwards. In Puri a sharp outbreak of the disease took place but no vector was incriminated. The newly appointed Malaria Officer of Orissa Province has begun to investigate the problem and the Malariologist of the Bengal Nagpur Railway is cooperating with him.

In the Chilka Lake area *A. sundaicus* had been, for some unexplained reason, almost entirely absent during the greater part of 1939. In December of that year it is reported that this mosquito reappeared in large numbers. There was a definite increase of malaria in Vizagapatam town and this affected the railway colony at Waltair. It is pointed out that if *A. sundaicus* establishes itself in the extensive swamp in the backwaters, a very serious situation will develop both for the railway colony and for the harbour. At Dongargarh a severe outbreak took place and no intensification of antimalarial measures could allay the situation. An unsatisfactory feature of the outbreak is stated to be the fact that the mosquito carrier still remains obscure.

In regard to the treatment of tuberculosis patients it is stated that negotiations have been entered into with the Pendra Road Sanatorium for the reservation of a number of cottages and beds for the treatment of the railway staff. During the year a start was made for placing the diagnosis and treatment of venereal diseases on sound lines. Treatment record cards have been prepared and issued to District Medical Officers and Assistant Surgeons. Sufficient time has not elapsed for assessing the results of the new measures.

Antirabic treatment was carried out in four centres and in all 160 patients were treated. Epidemic dropsy is stated to have caused some amount of incapacitation among the crews of the ferries and launches at Garden Reach and Shalimar during the year. Two hundred and eleven samples of cooking oil were sent to the Bengal public health laboratory for examination and seventeen of these were found to be contaminated with argemone oil. The necessary measures were taken.

The usual medical arrangements for the Rath Jatra and Dol Jatra festivals at Puri were made. Special arrangements were also made for the Congress Session at Ramgarh in March.

SECTION VII.

HEALTH OF JAILS IN BRITISH INDIA.

General.

52. The figures given in tables, VII (*i*) to VII (*iv*), relate to all classes of prisoners in the different provinces of British India. The health of the jail population in the Andamans is discussed in a separate paragraph of this section.

Population, accommodation and overcrowding.

53. The following table gives information regarding the authorised accommodation, excluding hospitals and observation cells, and the average daily population of jails in each province for the years 1939 and 1940.

TABLE VII (*i*).

Province	Authorised accommodation, excluding hospitals and observation cells.		Average daily population.		Number of persons per hundred units of authorised accommodation.	
	1939	1940	1939	1940	1939	1940
N.-W. F. P.	5,263	4,941	5,666	5,753	108	116
Punjab	14,713	14,713	20,543	21,589	140	147
U. P.	36,067	31,984	32,895	30,966	91	97
Bihar	13,013	9,541	11,876	12,769	91	134
Orissa	2,257	1,872	1,620	1,666	72	89
Bengal	16,584	16,871	19,057	19,234	115	113
C. P.	6,697	6,697	5,044	5,285	75	79
Bombay*	13,271	13,776	8,433	9,337	64	68
Sind	5,205	5,342	4,758	5,940	91	111
Madras	18,401	18,696	14,157	15,922	77	85
Assam	3,776	3,958	3,216	3,194	85	81

*Including Dharwar Borstal School.

The authorised accommodation increased during the year under review in Bengal, Bombay, Madras, Sind and Assam. The last two columns give the numbers of persons per hundred units of authorised accommodation in 1939 and 1940. It will be seen that, in both the years, there was no overcrowding in the United Provinces, Orissa, the Central Provinces, Bombay, Madras and Assam. In Bihar and Sind no overcrowding existed in 1939 while in 1940

the average daily number of persons was definitely in excess of the available accommodation. In the remaining provinces overcrowding existed in both the years. These two columns show that the highest figures were recorded in the Punjab in 1939 and 1940 and the lowest in Bombay. In the North-West Frontier Province the excess number of prisoners were kept in verandahs, hospital wards, tents and factory sheds.

Overcrowding existed in all the different types of jails in the Punjab, though the provision of temporary camps in certain jails helped to relieve congestion to a considerable extent. There was continued overcrowding in all the central and district jails in Bihar, the population being usually much in excess of the accommodation available in the jails. The overcrowding was due to large admissions of undertrial prisoners. In Bengal the male wards for the undertrial prisoners continued to be congested. In Sind owing to the abnormal rise in the number of convicted and undertrial prisoners all the large prisons and subjails were overcrowded. A new central prison at Sukkur and a training centre for adolescent and juvenile prisoners at Hyderabad are reported to be under construction.

Sickness and mortality.

54. In table VII (*ii*) are given the average daily number of constantly sick and the constantly sick rate per 1,000 of the average daily population. The rate decreased in the provinces of Bihar, Bengal, the Central Provinces, Bombay, Sind, Madras and Assam. The provinces of Orissa, the Punjab and the N.-W. F. Province recorded, on the other hand, increases in the rate.

TABLE VII (*ii*).

Province.	Average numbers of constantly sick.		Constantly sick rate per 1,000 of average daily population.	
	1939	1940	1939	1940
N.-W. F. P.	99	105	17	18
Punjab	336	403	16	19
U. P.	532	494	16	16
Bihar	211	219	18	17
Orissa	32	39	20	23
Bengal	735	669	39	35
C. P.	65	54	13	10
Bombay*	142	129	17	14
Sind	79	93	17	16
Madras	176	164	12	10
Assam	77	59	24	19

*Including Dharwar Borstal School.

Table VII (*iii*) shows the numbers of annual hospital admissions and deaths from all causes during the years 1939 and 1940. In 1940 the admission rate was highest in Sind and lowest in Assam. Assam on the other hand recorded the highest mortality rate of 18 per 1,000 of the average daily strength. Mortality rates above 10 per thousand were also recorded in Bihar, Orissa and the Central Provinces.

TABLE VII (*iii*).

Province.	Admissions.				Deaths.			
	Number		Rate per 1,000 of average daily strength		Number		Rate per 1,000 of average daily strength	
	1939	1940	1939	1940	1939	1940	1939	1940
N.-W. F. P.	2,008	3,204	354	557	20	40	4	7
Punjab	9,163	12,220	446	566	132	146	6	7
U. P.	14,275	12,265	434	396	244	261	7	8
Bihar	3,968	4,177	334	327	110	156	9	12
Orissa	714	589	441	354	16	19	10	11
Bengal	18,814	19,180	987	997	204	181	11	9
C. P.	1,679	1,444	333	273	76	66	15	13
Bombay*	5,082	6,067	603	650	58	66	7	7
Sind	3,845	6,437	808	1,084	31	48	7	8
Madras	3,965	4,248	280	267	88	128	6	8
Assam	1,092	816	340	255	85	58	26	18

*Including Dharwar Borstal School.

Weight of prisoners.

55. Table VII (*iv*) shows for the years 1939 and 1940 the percentages of prisoners who, at the time of their discharge from jail, showed an increase or decrease in weight and those whose weight remained stationary. It will be seen that, in every province, the majority of the prisoners gained weight during their stay in jail, which is indicative of an improvement in their health. The highest percentage of prisoners who showed loss in weight during 1940 was recorded in Sind. The Central Provinces recorded the highest percentage of prisoners who showed an increase in weight.

TABLE VII (*iv*).

Province.	Gained weight.		Stationary.		Lost weight.	
	1939	1940	1939	1940	1939	1940
N.-W. F. P.	55	61	39	31	6	8
Punjab	47	41	45	51	8	8
U. P.	50	56	41	35	9	9
Bihar	57	56	30	30	13	14
Orissa	68	59	27	33	5	8
Bengal	44	44	41	39	15	17
C. P.	66	67	25	25	9	8
Bombay	52	51	32	31	16	18
Sind	57	51	18	18	25	31
Madras	60	59	36	35	4	6
Assam	57	57	29	28	14	15

Remarks on individual provinces.

56. Brief remarks on the health administration of jails in the provinces are given below.

Apart from the care of the sick and the enforcement of a high standard of sanitation in jails and of preventive measures against infectious disease, the provincial jail health authorities also paid attention to certain measures which have an indirect bearing on the health and wellbeing of the jail population. These included the encouragement of general and physical education among the prisoners, improvements to their diet and lectures in first aid and health propaganda.

N.-W. F. Province.—During 1940 the jails remained free from cholera, smallpox and plague but there occurred a severe epidemic of malaria; 1,297 attacks and one death from this disease were recorded. It is stated that the incidence of dysentery, pneumonia, tuberculosis of the lungs, other respiratory diseases and influenza also showed an increase during the year compared with 1939, the recorded figures for these diseases in 1940 being 52, 85, 67, 428 and 72 respectively.

The general sanitation of all the jails is stated to have been satisfactory. Prisoners were allowed physical drill and took part in games according to the facilities available in the different jails.

Punjab.—Malaria contributed the largest number of admissions to hospital in the district and central jails. The total number of admissions was 4,222. The three jails at Multan alone were responsible for 2,170 admissions. Two attacks from smallpox were recorded but the jails were free from cholera and plague. Tuberculosis of the lungs and other respiratory diseases were responsible for 181 and 566 admissions and for 37 and four deaths respectively. Although, as stated previously, overcrowding was acute, the Inspector General of Prisons points out that non-official and other visitors to the jails reported that the general sanitation of the jails was good.

United Provinces.—In 1940 malaria was responsible for the largest number of admissions (2,824) and pulmonary tuberculosis for the largest number of deaths (52) in the jails of the United Provinces. Dysentery and diarrhœa caused 329 and 182 cases and six and three deaths respectively. Five attacks and three deaths from cholera were also recorded. Among the respiratory diseases pneumonia and pulmonary tuberculosis accounted for 273 and 124 admissions and other respiratory diseases for 957. The deaths from pneumonia, pulmonary tuberculosis and other respiratory diseases were 48, 52 and 17 respectively.

Bihar.—The sickness rate among the prisoners during 1940 was 17 per thousand of the average daily population as against 18 per thousand during 1939 although, as pointed out already, a definite rise took place in the average daily population, which resulted in overcrowding. Malaria was responsible for 934 admissions and six deaths as against 763 admissions and three deaths during the previous year. The number of admissions and deaths from dysentery rose from 530 and eight in 1939 to 664 and 23 in 1940. In the case of tuberculosis of the lungs the admissions decreased from 94 in 1939 to 79 in 1940 while the deaths increased from 18 to 28. Cholera was responsible for 11 admissions against one in the previous year. None of these proved fatal. Fifteen cases of smallpox with two deaths were recorded against five cases and one death in 1939. The jails were free from plague. Twelve sporadic cases of cerebrospinal fever with four deaths were recorded in the different jails of the province. The general sanitary condition of the jails is stated to have been satisfactory.

Orissa.—The jails were free from cholera, smallpox, plague and cerebrospinal fever. There were 126 admissions from malaria and 61 from influenza Routine examination of every prisoner for the detection of hookworm infection on admission to the jail was continued throughout the year.

The sanitation of all the jails and subjails was satisfactory. Sanitary works such as improvement of the water supply and provision of smoke outlets and of impervious floors to kitchens were carried out in certain jails.

The diet of the prisoners was improved by increasing the supply of vegetables. During the year an investigation into the incidence of vitamin B_1 deficiency among the prisoners on their admission to jail was carried out.

The conditions in the subjails of the province are stated to be unsatisfactory and the Inspector General of Prisons has submitted proposals to the Government that the supervision of these jails, which now rests with the Revenue Department, should be transferred to him.

Bengal.—There was one attack from cholera and three from smallpox. All of them recovered. Malaria was responsible for 3,640 admissions and six deaths. Among the total deaths the largest number was due to tubercle of the lungs (39), the next in order of frequency being pneumonia (27) and dysentery (17). Influenza was responsible for 1,549 admissions and 7 deaths. Arrangements are reported to have been made, in the central and district jails of the province, for outdoor games in addition to physical exercise.

Central Provinces.—The largest number of admissions was from malaria (380). The incidence of dysentery showed an appreciable fall from 433 admissions in 1939 to 153 in 1940. The highest number of deaths was due to pneumonia (13), tuberculosis of the lungs producing the next highest number (9). Influenza was responsible for 120 admissions but there was no death from this disease. Two attacks from smallpox were recorded but the

jails were free from cholera and plague. The health of the jail population is reported to have been generally good throughout the year. Compared with the year 1939 decreases were recorded in the death rate and in the constantly sick rate [tables VII (*iii*) and VII (*ii*)].

Bombay.—The chief causes of sickness were malaria, dysentery, respiratory diseases and diarrhœa causing respectively 1,308, 165, 150 and 86 admissions. The largest number of deaths was due to tuberculosis of the lungs (10) the next in order of magnitude being pneumonia (4). No attacks from cerebrospinal fever, cholera, plague and small-pox occurred during 1940 in any of the jails in the province.

The health conditions in the jails are reported to have been on the whole satisfactory. The Inspector General of Prisons states that the majority of sub-jails are located in buildings belonging to the Revenue Department and that the cells are mostly dark and ill-ventilated. These defects are being gradually remedied.

Sind.—Admissions from malaria rose from 1,087 during 1939 to 1,813 in 1940. This was largely due to an epidemic of malaria in the Sukkur district prison where the admissions rose by 752. The incidence of dysentery also rose from 149 in 1939 to 261 in 1940. An outbreak of cerebrospinal meningitis took place with nine admissions and five deaths.

The spraying of " pyrocide 20 " was regularly carried out in all the large prisons of the province, except the Karachi district prison, during the malaria season of 1940. The results are reported to be good. The use of mosquito nets by all malaria cases in prison hospitals was enforced.

The disinfection of blankets before reissue to prisoners was continued. Aged prisoners were given milk at the discretion of the medical officer.

Madras.—In the jails of Madras Presidency special attention was paid to conservancy. It is reported that the latrines in all jails except in the Penitentiary, Madras, are fly-proof. In the Penitentiary the construction of flush-out latrines was sanctioned. The drains in the garden of the central jail, Salem, and in the Borstal School, Palamcottah, were reconstructed. It is reported that measures were taken to prevent the introduction of infection into the jails, which continued to be free from cholera, plague and cerebrospinal fever. However, three non-fatal cases of smallpox occurred. The largest number of admissions to hospital was due to influenza. Malaria accounted for 166 admissions, dysentery 133, pneumonia 66, tuberculosis of the lungs 61 and other respiratory diseases 99. The largest number of deaths took place from pneumonia (24), other diseases in order of mortality being tubercle of the lungs (23), dysentery (7), diarrhœa (3), other respiratory diseases (3), malaria (1) and enteric fever (1).

Assam.—The largest number of admissions (191) was due to dysentery. Next in order of frequency were malaria (154), other respiratory diseases (122), pneumonia (48) and tubercle of the lungs (30). Tuberculosis was responsible for 11 deaths, dysentery for 10 and pneumonia for 9. All the jails remained free from cholera, plague, and enteric fever. The general sanitary condition of the jails was satisfactory. Pucca drains were provided in the jails at Tezpur, Mangaldai and Golaghat.

Coorg.—The accommodation available in the Mercara jail, excluding the hospital and observation cells, was 113 and the average daily population was only 40. Out of a total of six attacks, two were due to dysentery and one from each of the diseases, *viz.*, malaria, ankylostomiasis, pneumonia and gastric

ulcer. Only two deaths were recorded among the jail population. The conservancy arrangements are stated to have been satisfactory and the health of the prisoners was satisfactory.

Ajmer-Merwara.—In the Ajmer central jail the maximum population on any one day was 536 and the accommodation available was for 555. The daily average population of the jail was 476. During the year 11 attacks were recorded from malaria, two from dysentery, one from pneumonia, two from tubercle of the lungs, 44 from influenza, one from enteric fever, 12 from pyrexia of uncertain origin and 26 from other diseases. Two deaths, one from influenza and the other from valvular disease of the heart, were registered. The sanitary condition of the jail is stated to have been good. The scale of diet for the prisoners was improved during the year.

The Andamans.

57. The health of the prisoners in the Andamans is discussed below under two heads, (1) those living in cellular jails and associated barracks and (2) *talabdars* and self-supporting convicts. Of the prisoners in the second group, some live in single barracks, some in married quarters and the rest in the compounds of officers to whom they are attached as domestic servants, or in Government or private buildings.

In the cellular jails and associated barracks the average daily population during 1940 was 421 while the accommodation available was for 834. No overcrowding therefore existed in these jails. The total number of admissions to hospital during the year was 208 giving a hospital admission rate of 494 per thousand compared with 622 during 1939. The death rate was nil as against 22 during 1939. The constantly sick rate during 1940 was 18 compared with 26 in 1939.

Of 131 cases of illness that occurred among the prisoners 48 were cases of malaria, 27 of dysentery, 23 of diarrhœa and of influenza respectively, two, in each case, of pneumonia and tuberculosis of the lungs and 6 of other respiratory diseases. No case of cholera, smallpox, plague, enteric fever or cerebrospinal fever occurred among the prisoners.

The decreases in the sickness and mortality rates, to which attention has been drawn above, indicate that a higher standard of health was maintained among the prisoners of the cellular jails and associated barracks in 1940 than during the previous year. The sanitation of the prison is also stated to have been satisfactory.

The average daily strength of *talabdars* and self-supporting convicts during 1940 was 6,178. The question of overcrowding among them arises only in respect of the *talabdars* living in single or married quarters. The maximum number, on any one day, of the *talabdars* living in single barracks was 2,705 while accommodation was available for 3,501. In the case of married *talabdars* accommodation was available for 597 while the maximum number on any one day was 581. There was therefore no overcrowding throughout the year.

The rate of hospital admissions and the constantly sick rate per thousand of the average daily population were 512 and 21 compared with 508 and 24 respectively during 1939. The total number of deaths was 51 giving a rate of eight per thousand of the average daily population compared with a death rate of nine in 1939.

The following table shows the attacks from the principal diseases among *talabdars* and self-supporting convicts. Figures for 1939 are also given for comparison.

	1939	1940
Malaria	981	1,004
Dysentery	138	133
Diarrhœa	24	45
Influenza	49	188
Weil's disease	49	44
Tubercle of lungs	17	13
Ankylostomiasis	94	78

Apart from an appreciable increase in the incidence of influenza there was little variation between the two years in respect of the other diseases. In addition to the above diseases, a case of smallpox and four cases each of chicken-pox, measles and mumps were recorded. No death occurred.

Malaria has claimed, as usual, the largest number of patients. There was a small increase of 23 cases in the total incidence of the disease during 1940. Antimalarial measures have claimed considerable attention during the past years. A permanent antimalaria labour squad has been formed and it is reported that, along with antimosquito measures, an endeavour is being made to treat and cure as many patients as possible in order to reduce the reservoir of infection. The prophylactic administration of quinine to the convict population during the malaria season has also been carried out during the past few years. The beneficial effects of these measures are shown by the following figures for the incidence of malaria in the Settlement :—

Year.	Number of malaria cases.	Convict population.	Number of cases per 100 convicts.
1921	5,618	11,182	50
1931	3,334	7,622	44
1939	981	6,125	16
1940	1,004	6,178	16

Mention was made in the previous reports about the prevalence of Weil's disease in the island. In 1940 its incidence was the lowest on record during the quinquennium ending with that year. It is reported that the case mortality rate continues to be about 20 per cent in spite of the use of antisera prepared from local strains of the organism. The Senior Medical Officer states that a prophylactic vaccine has been prepared from three common Andaman strains and that, as its use among a selected group of convicts has given encouraging results, the work is being continued.

In regard to the water supply of the settlement new wells were constructed and existing ones were repaired. A large reservoir was in the process of construction at Lamba Lines village.

A voluntary organisation, the League of Health, has been formed for carrying out the health education of the general population and of the convicts On the committee of this organisation the Senior Medical Officer is serving in an advisory capacity. Apart from propaganda, the League of Health has taken part in the carrying out of sanitary works, such as the construction and repair of wells and the provision of cement latrines in certain places.

Conclusion.

58. From the paragraphs in which the sickness and mortality among the prisoners in the provinces have been briefly reviewed it will be seen that the usual standard of efficient health administration was maintained during 1940. The low incidence or complete absence of the common infectious diseases such as cholera, smallpox and plague, among the prisoners, in spite of their wide prevalence in the surrounding general population, indicates that the control of these infections is being effectively carried out.

As regards the Andamans, it was pointed in last year's report that the year 1939 was one of the healthiest on record. The sickness and mortality rates for 1940 show a further improvement on those for 1939. Special mention may be made of the measures taken for the control of malaria and Weil's disease.

SECTION VIII.

MEDICAL RESEARCH.

Introduction.

59. The progress of preventive medicine is dependent on continuous medical research. In the words of Sir George Newman*, " The chief business of conservative or preventive medicine is to apprehend the true nature of man and his environment, to learn how to strengthen and use the constant internal environment (physical and mental) and control the variabilities of the external environment, and thus establish and maintain harmony between them." Within the last few decades the scope of medical research has considerably widened. The study of man's internal environment has opened up a wide field in which the physiologist, the pathologist and the clinician have to work in close collaboration with the bacteriologist, the biochemist, the nutrition expert and the psychiatrist. The control of the external environment of man brings in the study of climatological and social factors which have a bearing on the health and wellbeing of the individual and of the community. In regard to the factors affecting man's internal and external environment, it is being increasingly recognised that the variability in respect of individuals demands that generalisations, before they can be taken as scientifically sound and administratively acceptable, should be based not on a few observations but on a large number of recorded facts. Modern research, whether it be in the field of social conditions or of bodily functions, has therefore tended in the direction of accumulating observations on a sufficiently large scale to justify the deduction of conclusions. Therefore the trained statistician also finds a place in the scheme of medical research because his services are required both for the planning of the experiment and for the interpretations of the results.

In India also there is evidence of a widening of the scope of medical research during recent years. In the past these studies had been mostly conducted by medical men in the bacteriological laboratories maintained by the Central and Provincial Governments and, to a smaller extent, by a few interested doctors in the wards of hospitals or in the field. The relatively rapid expansion of biochemical studies and of field investigations of an epidemiological or social nature has brought a wider range of workers into the health field. Studies in nutrition have also helped to bring about this welcome increase in the number of medical research workers. The scientific departments of the Indian Universities have begun to take an increasing interest in the furtherance of basic research in the fields of biochemistry, nutrition, physiology, pathology and clinical medicine, while even voluntary organisations and social workers are beginning to interest themselves in the investigation of socio-economic factors influencing the health of the community. The official public health departments are also engaging themselves in field studies for the investigation of health problems, such as those of malaria, nutrition, maternal and infantile mortality. This is all to the good. Preventive health work can only be based on an increasing mastery of man over his internal and external environments,

* " The Rise of Preventive Medicine ", page 151, published by the Oxford University Press.

and the quest of knowledge for the attainment of this mastery demands the services and cooperation of all who are properly equipped for investigating the various problems of public health.

The main lines of medical research in India have been described in the Public Health Commissioner's Preliminary Annual Report for 1939 and in the Annual Report for 1937. The Indian Research Fund Association is the premier organisation concerned with the direction of medical research and, in view of recent developments, the grants sanctioned by the Association are being made available for suitable workers and research schemes in universities and even to voluntary organisations interested in health problems. While it is obviously impossible to record any spectacular results from year to year, it may be stated that satisfactory progress was maintained during 1940 in the different researches financed by the Association. A detailed summary of the investigations carried out under the auspices of the Indian Research Fund Association and in different research institutes in India, including the medical colleges, will be given in the Supplement to this report, which will be published at an early date. In the meantime a brief survey of medical research during 1940, from the point of view of public interest, is given in the following paragraphs.

Nutrition.

60. The problem of improving the nutrition of the people of this country presents many difficulties. The dietetic habits of the inhabitants of any locality are largely determined by the articles of food that are produced locally. In order to obtain a balanced diet it is often necessary that the locally available foodstuffs should be supplemented, in a larger or smaller measure, by articles which can be obtained from outside. Any long term plan for improving the nutrition of the people must therefore provide for a change in agricultural policy in order to introduce the cultivation of other desirable articles of food as well. In this connection the recommendation of Sir John Russell regarding agricultural policy in India may be quoted. " The first need in my view is to make a nutrition survey in each province so as to discover what are the chief deficiencies in dietary ; the medical authorities should then meet the agricultural experts to decide what crops, including fruits and vegetables, should be grown to supply the missing elements. The approximate quantities needed should be indicated, and the agricultural staffs acting along with the rural development authorities should then encourage by all means in their power the growth of these crops."

It will thus be seen that the collection of information regarding the diets consumed by the people is the first step towards the formulation of a nutrition policy. Towards this end, within recent years, over 50 surveys have been carried out in various parts of India. The results of these surveys have been brought together in a booklet entitled " Note on the results of diet surveys in India " issued in 1940 by the Indian Research Fund Association.

The majority of the surveys were carried out in rice producing areas and valuable information regarding the deficiencies of the rice diet and the ways of making up such deficiencies has been embodied in the Note. Although rice supplies 80 to 90 per cent of the total calorie value required, this cereal is deficient in certain essential requirements such as calcium and vitamin A. While attempts have been made to cultivate strains of higher nutritive

value the results so far achieved do not suggest that any striking success is likely to be obtained. It has been demonstrated that, apart from intrinsic deficiencies in certain directions, the processes of milling, washing and cooking the rice contribute largely to a reduction of its vitamin content and therefore its nutritive value. Parboiled rice, even when highly milled, retains certain vitamins in considerable quantities and is therefore to be preferred to raw rice.

Animal experiments have shown that even a partial substitution of rice by wheat or one of the millets grown in the country improves the diet considerably. The cultivation of wheat in India is limited by climatic conditions, but the millets can be grown all over the country and the desirability of developing the cultivation of millets and of encouraging their use by the people of the rice producing areas requires consideration by the authorities.

Further, the pulses can supply some of the important factors in which rice is deficient. The question of increasing the consumption of pulses has been considered by the Imperial Council of Agricultural Research. This organisation has initiated a coordinated scheme of research in the provinces in order to investigate the possibility of developing strains of higher yield as well as of encouraging the extension of areas of pulses under cultivation.

The surveys show that the consumption of fruits and vegetables is much below the desirable level. Leafy vegetables are particularly rich in vitamin A, vitamin C and calcium and they form therefore a valuable supplement to rice diets. It is pointed out that the commonest and cheapest varieties are usually as valuable as the more expensive. It is stated that, in many parts of India, the villager is not interested in growing vegetables even when land and water for this purpose are available. The staff of Health Units working among the rural population are laying special emphasis on the development of kitchen gardens. A good deal of educational propaganda for persuading the people to produce and consume more fruits and vegetables will have to be carried out before any marked improvement of the existing state of affairs is produced.

The proportion of fat in the common Indian diet is defintely below the required standard. It has been suggested that the intake of vegetable fats and oils should be increased and that it is desirable to increase the production of oil seeds by selective and other methods.

The addition of meat and fish to the diet markedly improves its quality. Under existing conditions meat is too costly to become a general article of food. The possibilities of developing the fish industry require, on the other hand, serious consideration. In India the industry is in a backward state and, if efficient methods such as those employed in Europe and Japan are applied to this country, a valuable supplement to the diet of the people can be provided and the general level of nutrition can thus be raised.

For the past few years investigations regarding the vitamin A content of Indian fish liver oils have been in progress in the Nutrition Research Laboratories, Coonoor, and in some other institutions in the country. It has been shown that certain varieties of fish available in Indian waters are particularly rich in vitamin A. A cod liver oil substitute prepared from shark and saw-fish liver oils combined with groundnut oil is being prepared in Travancore, Malabar and Bombay, and it is likely that, as far as the vitamin A fraction is concerned, the replacement of cod liver oil by locally produced fish liver oils has now become a feasible proposition. In South and Central India the need for vitamin A is greater than that of vitamin D. In North India where in certain parts rickets prevails, vitamin D is of great importance. Mixtures of shark liver oils

with groundnut or some other vegetable oil can be reinforced with vitamin D in order to produce a mixture with its content of vitamin D as great as that of cod liver oil.

An appreciable section of the population of India is vegetarian by habit and religious custom. Red palm oil as a substitute for cod liver oil for the purpose of supplying vitamin A is of particular interest in this connection. The possibility of producing a palatable and commercially suitable mixture with approximately the vitamin A activity of good butter has been under investigation in the Harcourt Butler Technological Institute, Cawnpore. Experiments have shown that the refining and deodorisation of this oil lowered its carotene content and its vitamin A activity by about 50 per cent. In regard to the keeping qualities of various mixtures of red palm oil with other vegetable oils it has been found that such mixtures, when exposed to light, are bleached within 11 months with the result that carotene is destroyed. If the mixtures are kept in tin containers it has been shown that the loss of vitamin A activity is less.

Education of the people regarding food and nutrition is an important part of the general campaign for raising their level of nutrition. The best results are likely to be obtained by concentrating on children in the schools, and one of the subjects discussed by the Nutrition Advisory Committee of the Indian Research Fund Association at its meeting in December 1940 was the necessity for providing for the education of children in this subject. It has been decided to prepare a textbook in very simple language dealing with the different aspects of nutrition. An elementary primer, based on the data accumulated by nutrition workers in India, will be of value to educational authorities.

Other researches relating to nutrition carried out in 1940 under the auspices of the Indian Research Fund Association included (1) enquiry on cheap wel balanced diets under the Bombay Presidency Baby and Health Week Association, Bombay ; (2) ascorbic acid enquiry under Dr. B. C. Guha at the University College of Science and Technology, Calcutta ; (3) nutrition investigation of Bengal fish under Dr. B. C. Guha at the University College of Science and Technology, Calcutta ; (4) studies on human nutrition with diets under Dr. K. P. Basu at Dacca University ; (5) enquiry on the working efficiency of Indian labourers under Professor W. Burridge at the King George's Medical College, Lucknow ; (6) enquiry into calcium metabolism in health and disease under Dr. V. N. Patwardhan at the Seth G. S. Medical College, Bombay ; (7) tissue culture enquiry under Dr. G. Sankaran at the All-India Institute of Hygiene and Public Health, Calcutta ; (8) enquiry into malnutrition of Bengali boys with reference to vitamins A, B and C deficiency under Professor N. M. Basu at the Presidency College, Calcutta ; (9) enquiry on nutrition and its bearing on preventable blindness and eye disease in Bengal under Lieut.-Col. E. W. O'G. Kirwan, I.M.S., Professor of Ophthalmic Surgery, Medical College, Calcutta; (10) enquiry on the seasonal variation of vitamin A content of liver oil of sea fish and the effect of parching on the biological value of proteins of cereals and pulses in the Physiology Department of Seth G. S. Medical College, Bombay.

Maternal mortality.

61. Maternal mortality enquiries have been completed in Calcutta, Bombay, Delhi and Madras. For the past two years maternal mortality returns have been collected by the Director General, Indian Medical Service, from hospitals

with 300 or more deliveries per year in different parts of the country and this information has been published in the annual reports of the Public Health Commissioner. The Maternal Mortality Advisory Committee of the Indian Research Fund Association at its meeting in December 1940 expressed the view that the findings of these investigations constitute a sufficient basis for administrative action by provincial health authorities and that further enquiries which may be found necessary in rural areas in different parts of the country or in areas with special problems should be undertaken by the public health departments concerned. A subcommittee of the Maternal Mortality Advisory Committee has prepared a memorandum for the conduct of maternal mortality enquiries and this memorandum contains the necessary instructions for the guidance of local health authorities for carrying out their investigations on proper lines.

The Committee also considered that investigations into the predisposing and clinical causes of infant morbidity and mortality are important in view of the large amount of preventable suffering that this section of the population is subjected to in India. In order to secure uniformity of action by health authorities the Maternal Mortality Advisory Committee recommended that a subcommittee should draw up a memorandum for the carrying out of such investigations.

Cholera.

62. Field studies were in progress during the year in Khulna in Bengal and in the Cauvery delta in the Madras Presidency. Laboratory studies were carried out at the Central Research Institute, Kasauli, the School of Tropical Medicine, Calcutta, the Indian Institute for Medical Research, Calcutta, and at the Carmichael Medical College, Calcutta. The reports of these different enquiries were discussed in detail by the Cholera Advisory Committee of the Indian Research Fund Association and the main points that emerged were :—

(*i*) The field investigation in Bengal showed an exact relationship between the distribution of the non-hæmolytic agglutinable vibrio of ' O ' group No. I and the cholera case, such vibrios not being found except in the cholera case, its immediate contacts and water in the vicinity. On the other hand the hæmolytic vibrio of the same serological type (the El Tor type) was found to have a wide distribution in water supplies and often without any relationship to cholera. The experience of the Madras field enquiry corroborated this finding. The El Tor vibrio was not found in the stools of cholera cases or normal individuals. The conclusion reached was that the findings so far obtained do not suggest that the El Tor vibrio plays any part in the ætiology of cholera in India. It is considered that the two agglutinable types of vibrios should be further studied for the purpose of ascertaining whether any differences exist other than in respect of hæmolysis.

(*ii*) The observations made on the incidence of cholera in the Cauvery delta suggested that the opinion hitherto held that cholera is endemic in the area required further investigation. The significance of the distribution of the Inaba and Ogawa types of infection in different parts of the province should be further investigated. The determination of the type responsible for particular outbreaks might be of value in tracing the lines of spread of infection.

Plague.

63. Plague researches were confined to the Haffkine Institute, Bombay, and the Cumbum valley in Madura district in the Madras Presidency. At the Haffkine Institute various laboratory studies were in progress including trials of the value of antiplague serum and two synthetic drugs, namely, sulphathiazole and sulphapyridine for the treatment of the disease. In laboratory animals sulphapyridine produced the same effect as sulphathiazole in the early stages of the infection while, after septicaemia sets in, sulphathiazole is more effective. It was possible to carry out a field trial of these three forms of treatment during an epidemic of human plague in Bettiah Raj, Bihar. The numbers of cases treated were not large but, on the information available, all the three, serum, sulphapyridine and sulphathiazole gave a significant reduction of mortality in comparison with the control group; but no significant difference was shown to exist between the values of the three forms of treatment.

Other studies included the investigation of the factors responsible for the production of resistance against the disease.

In the Cumbum valley epidemiological studies of a useful character have been in progress for some years past. An important finding from the point of view of preventing epidemics of the disease is that, by the repeated cyanogas sing of the rat holes in a plague infected or threatened area, the incidence of the disease can be definitely controlled.

Malaria.

64. The Malaria Institute of India which was previously known as the "Malaria Survey of India" was established under the Indian Research Fund Association in 1927. The activities and scope of the Malaria Survey widened rapidly. Its advice was sought on malaria problems both by the Central and Provincial Governments and it soon became apparent that the Survey had a dual rôle, firstly that of malaria research for which it was originally constituted and secondly that of advising public health administrations in regard to the control of malaria. As a result the Malaria Survey of India became organised in two sections known as the 'Research' and 'Public Health' Sections and an important stage in its history was reached on the 1st of April 1940 when the Public Health Section was taken over by the Government of India. The research side continues under the Indian Research Fund Association.

An important function of the Institute is the holding of malaria courses for medical officers. The first course was given at Amritsar in 1910. Between that year and 1925 six more courses were given and these were conducted at Delhi and Amritsar. From 1925 onwards the malaria course has been held every year. The courses were financed by the Indian Research Fund Association. In 1940 in addition to the usual annual course, five special courses were held for Army personnel, and an innovation was made by instituting a course for engineers. The necessity for *liaison* between the Public Works and the Public Health Departments is recognised by all who are concerned with the

control of malaria and a significant advance towards this *liaison* was made when sixtyone engineers from all parts of India attended this course at the Malaria Institute.

A conference of chief medical officers of Railways was held in Delhi in February 1940 and the members visited the field station of the Institute and discussed with the Director various malaria problems in which the Railway authorities are interested. The members of the annual conference of irrigation engineers also paid a visit to the field station. The increasing interest and cooperation of the engineering profession in India in regard to the control of malaria is one of the most encouraging signs of progress in the campaign against India's major health problem.

A number of insecticides were tested biologically at the Institute, including extracts of pyrethrum flowers grown in the Punjab, Kashmir, the Nilgiris, Travancore and in the Palni Hills of Madura district. It is stated that flowers from all these sources yielded excellent results.

The antimalaria operations in Delhi continued to be supervised by the officers of the Institute. In conjunction with the engineers a special technique has been evolved by which the drainage of extensive areas can be accomplished at a low cost. In certain villages in Delhi Province field researches continued with special reference to the effect of spraying operations with pyrethrum insecticide in the homes of the villagers.

In the Terai areas of the United Provinces a research unit of the Institute completed two years' observations and the data collected are being analysed. In the Wynaad district of Madras controlled experiments were carried out during the malaria season for testing the value of herbage packing as an anti-malaria measure. The results, though successful, served to emphasise the necessity for constant skilled supervision throughout the premonsoon season. In a number of villages in the vicinity of Chilka Lake in Orissa, epidemiological studies were continued throughout the year. As a result of more than 19,000 mosquito dissections it has been established that *A. sundaicus* is the chief vector in this area and probably the only one of practical importance. It has been shown that malaria exists in this area in hyperendemic form in some of the islands situated near the mouth of the lake. The epidemics which occur from time to time in the villages along the shores of the lake owe their origin to these islands.

Other activities of the Institute included the testing of the effect of drugs on animal malaria, work on malarial immunity, investigations on the malaria parasites of man and animals, study of mosquito bionomics, investigations on malaria transmission and the determination of food preferences of anophelines.

At the Haffkine Institute, Bombay, the action of sulphathiazole on *rhesus* monkeys infected with Plasmodium *knowlesi* was investigated. It was shown that radical cures were obtained with a total dosage of three grammes given over a period of three days. The drug produced no toxic symptoms. When it was given in smaller quantities relapses occurred.

In regard to the action of atebrin it was demonstrated that, in order to eliminate Plasmodium *knowlesi* from the peripheral blood of monkeys with their spleen removed or blocked, the amount of atebrin required was found to be considerably greater than in normal monkeys. The inference appears to be that the reticuloendothelial cells of the spleen probably play an important

part in promoting the action of these drugs. Other experiments at the Haffkine Institute indicated that the problem of immunity in malaria involved the possible interaction of both humoral and cellular factors.

Studies on the mechanism of defence against malaria were carried out by the Director of the Pasteur Institute, Coonoor. These studies also pointed to the conclusion that the mechanism of defence against malaria is partly cellular and partly humoral and that it is effective only in the presence of an adequate measure of both these factors. Certain experiments carried out on malaria and nutrition in collaboration with the Nutrition Research Laboratories, Coonoor, showed no significant difference in the course of malarial infection in monkeys fed on a well balanced diet and in monkeys receiving diets deficient in quality but not in quantity.

Leprosy.

65. Leprosy research was in progress during 1940 mainly at the Calcutta School of Tropical Medicine under Dr. J. Lowe and in the Lady Willingdon Leper Settlement, Chingleput, Madras, under Dr. R. G. Cochrane. The field epidemiological studies that have been carried out seem to suggest that wide variations exist not only in the incidence but also in the severity and the age distribution of leprosy cases in different parts of the country. Dr. Lowe considers that the chief factor producing these differences is race, although he believes that there may be other possible factors also. For instance, it is stated that in certain races, *e.g.*, the Santhals, leprosy may be quite common but mild in its manifestations, while in other racial groups and in hill tribes leprosy is rare but severe.

In considering the importance of leprosy as a public health problem, it is necessary not only to take into consideration the figures of incidence but also the type and age distribution of cases based on detailed surveys. In order to carry out leprosy surveys on a uniform basis in different parts of the country and to ensure that the information collected is comparable, the Leprosy Committee of the Indian Research Fund Association appointed a subcommittee to prepare a memorandum on the method of conducting a leprosy survey. The report of this Committee will, it is hoped, prove to be of great value to public health authorities all over the country.

Studies carried out in the leprosy out-patients' department of the School of Tropical Medicine, Calcutta, have indicated the occurrence of seasonal variations in the clinical and epidemiological findings of patients. The reasons for these changes are under investigation.

The value of the addition of skimmed milk to the diet of children suffering from leprosy has been under investigation by Dr. Cochrane in Madras. Preliminary investigations seemed to suggest that some benefit was being conferred on the lepromatous type of patients ; further work has not, however, confirmed this view. On the other hand, the value of wheat in the relief of chronic bone and nerve pains in leprosy has, it is stated, been confirmed. The value of M. & B. 693 in the treatment of leprosy was tested. While no beneficial effects on the disease could be shown, it is stated that the drug is of value in the treatment of intercurrent conditions, such as sepsis and pneumonia.

SECTION IX.

VOLUNTARY ORGANISATIONS.

Introduction.

66. The reports received from the Provincial Directors of Public Health show that voluntary workers are taking part in an increasing measure in health activities. In maternity and child welfare work voluntary effort has led the way and provincial health administrations are now reaping the benefit of the pioneer work of voluntary organisations. This closely follows the train of events in England where unofficial organisations first stimulated the interest of the public in special aspects of public health work such as the care of mothers and children and the prevention of tuberculosis. Health propaganda is another channel into which unofficial workers are directing their activities in India. It is reported from the provinces that, through cooperative effort, local resources for service to the community are being mobilised by the people themselves for such objects as the improvement of village sanitation, the prevention of malaria and other infectious diseases, the provision of medical relief and the organisation of preventive health measures in connection with festival centres. This is all to the good because, apart from the fact that such activities supplement what the Government and local bodies can provide for the welfare of the people, the development of the spirit of self-help and of cooperation among themselves forms the best guarantee of continued progress in the community.

In the following paragraphs the activities, during 1940, of some of the more important voluntary organisations working in different parts of the country are briefly summarised.

Indian Red Cross Society.

67. The year 1940 was a period of considerable activity for this Society. One of its primary objects is the relief of sickness and suffering in war and an effort was made during the year to contribute as much as possible out of the funds of the Society towards the welfare of the sick and wounded. It is gratifying to record that these activities did not cause any curtailment of the normal peacetime functions of the Society.

In accordance with its policy in past years the Society assisted the activities of corresponding associations in other countries. At the beginning of the year an earthquake of major proportion occurred in the province of Anatolia in Turkey killing over 24,000 persons and rendering many more thousands homeless. The Indian Red Cross Society cabled Rs. 2,000 to the Turkish Red Crescent and invited Provincial and State branches also to contribute. His Excellency the Viceroy issued a Turkish Earthquake Relief appeal and the Red Cross Society was made responsible for the disposal of the

money received. At the end of 1940 the Society had remitted as much as Rs. 3,81,000 to the Turkish Red Crescent for the relief of the suffering in the devastated areas.

The increasing problem of war refugees in Europe also claimed sympathy and help. The sums of money sent abroad included Rs. 1,35,000 for the relief of French refugees, Rs. 1,972 for assistance to destitute Finnish children, Rs. 1,000 for relief work in Poland and Rs. 13,100 as a contribution to the Greek Red Cross on the invasion of that country by Italy. A contribution was also sent to the National Red Cross Society of China. In addition the Society made its usual contributions to the International Red Cross Committee and the League of Red Cross Societies, the amounts being Rs. 1,000 and Rs. 4,181 respectively.

In India a sum of Rs. 3,000 was contributed towards relief measures in the famine stricken areas in the Hissar district of the Punjab.

A grant of £150 was received from the National Institute for the Blind in London for carrying out educational propaganda on the prevention of blindness in India and for the preparation of a cinema film on the subject.

The St. John Ambulance Association, Indian Council.

68. Through this Association men and women are trained in first aid, home nursing and allied subjects. The subject of air raid precautions has also been added recently. The number of persons trained in these subjects during 1940 was higher by 14 per cent than the figure for 1939, which was also a record year. In all 58,011 persons attended the different courses of training in 1940 and of these 38,596 qualified themselves for the Association's certificates. In first aid the number of persons granted certificates was 35,166, in home nursing 2,894, in hygiene and sanitation 342 and in domestic hygiene and mothercraft 194. In addition 87 persons received voucher certificates by passing a second higher test in first aid, 229 obtained medallions for a third higher examination in the same subject while 72 persons earned labels and two obtained pendants as the result of passing further examinations in first aid and home nursing. The A. R. P. courses were attended by 2,902 persons of whom 936 were awarded ordinary certificates and 310 certificates as instructors. The Mackenzie course for school children was given to 10,918 persons and of these 7,647 qualified for certificates.

The Bombay Mofussil Maternity, Child Welfare and Health Council.

69. During 1940 the Council employed 66 doctors, either paid or honorary, 29 health visitors, 13 nurses, 17 midwives and 22 trained *dais*. The organisation consisted of nine maternity homes, 17 infant welfare centres and 21 institutions which combined the functions of a maternity home and welfare centre. District committees of the Council exist for Poona, Satara, Ahmednagar, Sholapur and Dharwar districts. The touring lady doctor maintained

by the Council was given three months' training in maternity and child welfare at the Lady Reading Health School, Delhi, during the year. She inspected the various maternity and child welfare centres affiliated to the Council and six local board centres approved by the Surgeon General for maternity work. She also delivered lectures in each of the centres on welfare work and hygiene. Practical demonstrations in midwifery were given to the local staff and the midwives.

The Council maintains the Poona Health School. The School has now received recognition from the Bombay Nurses, Midwives and Health Visitors' Council. Seven students were trained in 1940-41.

The Council receives an annual recurring grant from the Bombay Government of Rs. 17,000 for its general expenses and for the Poona Health School. Another Government grant of about Rs. 2,200 was received towards the expenditure incurred by the centres in connection with the training of *dais*. Besides various charitable institutions the Bombay branch of the Indian Red Cross Society also makes an annual grant of Rs. 3,000 towards the funds of the Council.

The Bombay Presidency Infant Welfare Society.

70. This organisation started work on a modest scale in the year 1920. In the intervening period of 20 years the Society has been able to establish an excellent record of valuable work as will be seen from the figures shown below :—

	1922	1925	1930	1935	1940
New admissions of infants at clinics	1,798	4,024	5,112	5,823	7,103
New admissions of expectant mothers at clinics . .	559	1,269	2,458	5,510	8,437
Cases sent to maternity hospitals	135	199	2,036	3,079	3,933
Cases delivered in the Society's maternity homes . . .	..	..	352	2,122	2,648

The number of expectant mothers who attended the centres maintained by the Society during 1940 was 9,635, and of these 28·3 per cent had four or more attendances. The total number of visits paid by these mothers during 1940 was 35,726, an increase of 6,764 over the figure for the previous year. It is stated that the women are gradually beginning to realise the importance of regular examinations during the period of pregnancy.

The Society maintains three maternity homes. They are at Wadi Bunder with 16 beds and at Worli and DeLisle Road with 32 beds each. Clinics for venereal diseases also function once a week at these centres.

Of the expectant mothers cared for by the Society throughout the period of their pregnancy 93·8 per cent had skilled attendance at the time of confinement, practically all of them having been admitted to maternity homes. It is stated that the existence of facilities for free transport has made it possible for the health visitors of the Society to direct these women to the different maternity institutions in the city.

A system of follow up exists for the mothers delivered in the Society's maternity homes and they are stated to be under observation for a period of three months. The health visitors instruct the women in mothercraft and in

the modes of hygienic living. These friendly visits to the homes of the people are stated to have increased the popularity of the centres and the attendance of babies at the clinics showed an increase of 6,800 during the year. Mothers are becoming interested in the records of weight of their babies and are said to be anxious to learn about the methods of keeping up their own and their children's health.

A creche is maintained by the Society at the DeLisle Road centre. Children up to the age of five, whose mothers go to work, are admitted to the creche. The woman in charge is trained in kindergarten and she teaches the children drill, reading and writing in Marathi and music. They are properly fed at regular intervals and cases of children losing weight or not improving in health are brought to the notice of the woman medical officer. The average daily attendance is stated to be 58.

In addition to the above activities the Society gives training to probationer midwives. Permission has been granted by the Bombay Nurses Midwives and Health Visitors' Council to the Society to train 16 probationer midwives at the three maternity homes of the Society. Of the 13 admitted for the course in 1939 eight passed out during 1940. It is also stated that medical graduates are given facilities for three months' training in all branches of maternity and child welfare work and that nine women doctors received this training during the year.

The Bombay Presidency Baby and Health Week Association.

71. This Association has been actively engaged in health propaganda. For this purpose it has maintained three cinema units, a large number of exhibits, magic lantern slides, posters and other material for health education. In 1940 the Association organised 23 health and child welfare exhibitions in different parts of the province. Cinema shows numbered 226 as against 154 in 1939. The Provincial Education Department has encouraged the authorities of primary schools to purchase the posters, charts and models on health subjects prepared by the Association for the teaching of hygiene in schools. A book in Marathi dealing with nutrition has been published and it is stated that the Director of Public Instruction has recommended it for use in secondary schools.

In addition to these activities the Association conducted researches on nutrition with the help of grants from the Indian Research Fund Association. It is stated that a balanced vegetarian diet with a supplement of six ounces of milk per day has been shown to be of value and costs Rs. 5/8/- per month per person. The nutrition investigations also included analytical studies of various articles of food. One of the results to which attention is drawn is that the parching of cereals and pulses increased the biological value of their proteins and, in the majority of cases, their digestibility.

Association for the Prevention of Blindness, Bengal.

72. As has been shown in previous annual reports this Association has been carrying on good work by treating the rural population for eye conditions and

by carrying on active propaganda amongst them regarding the hygiene of the eye and the common causes of blindness in India. The Association has now reached the tenth year of its existence. A survey of its work in recent years is interesting.

In March 1936 the first travelling eye dispensary was started and was financed by a grant of Rs. 35,000 received from Their Majesty's Silver Jubilee Fund. In August 1937 a second travelling eye dispensary was brought into existence. These dispensaries proved to be extremely popular with the rural population. The demand that came from the villages for an extension of this service attracted the attention of the Provincial Government. In 1939-40 an annual grant of Rs. 15,000 was sanctioned by the Government for a period of three years for starting two more travelling eye dispensaries under the auspices of the Association. The third and fourth dispensaries started work in February and March 1940. The Government of Bengal have under consideration a proposal to increase the annual grant so as to enable the Association to start a fifth travelling dispensary.

The medical officers in charge of the dispensaries have all had special training in diseases of the eye. The dispensary halts in a centre for about three months and, during this period, carries out the treatment of different eye conditions and performs operations either at the subdivisional hospitals, wherever available, or in buildings improvised as hospitals. The preventive aspect of the problem has not been neglected. Propaganda by lantern lectures and other modes of educating the people is carried out. In addition sample surveys have been done in order to ascertain the prevalence of blindness and of diseases of the eye among the population. The dispensary has proved itself to be so useful that a prolongation of its stay in the same area is often demanded by the people and, in many cases, the inhabitants are willing to subscribe and pay for its maintenance during that period.

Although the figures for blindness given in the 1931 census report are defective, they give some indication of the relative incidence of this condition in different parts of the country. Thus, in Rajputana, the Punjab and the United Provinces, hot and dusty areas where glare is trying to the eyes, the proportions of blind persons were reported to be 386, 245 and 291 per 100,000 while the greener and shadier provinces of Assam and Bengal had an incidence of only 97 and 72 per 100,000. More information than is at present available is required regarding the extent of prevalence of eye diseases and of the disability arising from partial and total blindness in different parts of the country. As has been pointed out already, sample surveys are being carried out by the medical officers in charge of the travelling eye dispensaries in Bengal and in this way much valuable information is gradually being collected in that province. The data thus collected will present a fuller picture of the province as a whole and will undoubtedly help towards the formulation of an adequate programme of preventive and curative work.

Action on similar lines is eminently desirable in the other provinces of India. Variations in the relative intensity of prevalence of specific eye conditions are bound to exist in different parts of the country. For instance, there is reason to believe that the incidence of trachoma is higher in northwestern India than in the other parts. The Bengal scheme of rural eye dispensaries has much to commend itself for adoption in other parts of India in order to provide the rural population with facilities for the treatment and prevention of eye diseases. In order to help Governments and public bodies interested in developing such work the Association has published a booklet entitled " Details of a Travelling Eye Dispensary " and copies of this publication can

be had, free of charge, from the Secretary of the Association whose address is No. 94, Chittaranjan Avenue, Calcutta. It is to be hoped that this important problem, which is responsible for a large amount of suffering and disability in the country, will receive adequate attention from the health authorities in the provinces.

The Bengal Health Welfare Committee.

73. This Committee coordinates the activities of several organisations engaged in health work. Brief notes on the activities of these individual organisations are given below.

The Calcutta Maternity and Child Welfare Committee controls the work of six welfare centres in Calcutta city, four of which are maintained by the Red Cross Society and the remaining two by other organisations. Of 1,690 prenatal cases on the rolls of the centres 990 or 53 per cent attended the prenatal clinics at the centres. However, only about 20 per cent did so with sufficient regularity to have attained to the minimum standard of care which is considered necessary for the expectant mother. This minimum standard is stated to be the following :—

(1) the patient should be under observation by a health visitor or doctor from a period not later than the 30th week of pregnancy ;

(2) the patient should follow to the best of her ability the advice on diet and hygiene ;

(3) if any treatment is advised the patient or her relations should secure it for her and see that it is carried out ;

(4) the urine should be examined for albumin at least twice during the last ten weeks and one of these examinations should be in the last four weeks ; and

(5) an abdominal examination should be made during the last four weeks.

The maternal mortality rate in the population served by the centres was 11·7 per 1,000 live-births in 1940 as against 12·9 in 1939 and 23·7 in 1937. It is stated that the average standard of health of the women during the prenatal period was low, that nearly every woman appeared to be anæmic and that quite a number of cases showed definite signs of severe anæmia. The majority of such cases are reported to have responded to treatment with a full dose of iron and a diet rich in vitamin B. Further, as pregnancy advanced, most women showed signs of calcium deficiency and daily administration of 30 grains of calcium lactate was found to be useful.

The infant mortality rate for the centres is stated to have been 117 and the neonatal mortality rate 42 *per mille*. The causes of death for 181 infants are given ; of these 65 occurred within the first month. During the first month prematurity appears to be the most important cause of death while causes associated with environmental conditions such as respiratory diseases are relatively unimportant. For instance, out of a total of 65 deaths among infants under one month, the cause of death in 33 cases was prematurity while

only one death was due to gastro-intestinal diseases and six due to respiratory diseases. On the other hand, in the age group 1-12 months, prematurity was responsible for only seven out of a total of 116 deaths, while respiratory diseases accounted for 33, gastro-intestinal diseases for 12 and neglect or starvation for 32 deaths.

The District Maternity and Child Welfare Committee is concerned with the organisation of this class of work in all parts of the province except Calcutta. It is stated that there is a growing demand from the rural areas for the establishment of maternity and child welfare centres and that one of the main difficulties in meeting this demand is the inadequate supply of health visitors. The health centres maintained by the Committee at Chapra, Rangamati, Orakandi, Shibchar, Kalimpong, Darjeeling, Kaurapukar, Raniganj and Noakhali are stated to have made satisfactory progress. Three other centres are receiving financial help and are stated to be doing well.

The Sir John Anderson Health School Committee's Report shows that, during the year, school medical inspection work and visits to the homes of the pupils requiring special care and treatment were added to the curriculum for the first time. A short course in tuberculosis was also given to the students.

The Bengal Health Education Committee has been fostering health education in the province by assisting local authorities in the organisation of health exhibitions and by making grants of money and propaganda material to approved exhibitions. During 1940 the grants totalled Rs. 1,215 while the value of literature distributed was Rs. 861. In addition the usual grant of Rs. 800 was made to the Calcutta Health Week Committee. Another sum of Rs. 600 was given to the Bengal Nutrition Committee to assist them in the preparation of propaganda literature in the field of nutrition. In consultation with the Director of Public Health, Bengal, arrangements were made for the purchase of posters on different health subjects and for their distribution throughout the province.

The Calcutta Health Week Committee is concerned with health education in the city of Calcutta. A subcommittee of this Committee entitled " The Cleaner Calcutta Campaign Committee " has been formed. Attention has been concentrated on the cleaning of *bustees*, inspection of tea shops and markets and on propaganda. It is stated that two *bustees* have been selected for concentrated work, that the owners have been induced to build proper impervious drains, repair old privies and provide new ones, that the cleaning of drains has been carried out through the help of the inmates of the *bustees* and outside volunteers and that intensive health propaganda has been carried out in these areas. It is stated that 129 tea shops were visited repeatedly by the members of the committee and that improvements have taken place as the result of these visits. Eleven markets were inspected but the response from the owners of private markets to the committee's suggestions for improvement is stated to have been unsatisfactory.

The International Health Division of the Rockefeller Foundation in India.

74. During 1940 four medical men and two engineers of the field staff of the International Health Division of the Rockefeller Foundation were located in India, three in Bengal, two in Madras Presidency and one in Delhi. The Central office of Dr. W.P. Jacocks, the Regional Director in India and Ceylon of the

International Health Division continued to be in Delhi. In 1939 an accessory office was opened in Calcutta and the health work in which the Foundation has been cooperating with the health authorities in Assam, Bengal, Bihar and Orissa was supervised from the Calcutta office.

The activities of the Division consisted as usual of research, public health education and assistance in developing rural health work in India through the organisation of health units.

The research work undertaken during 1940 related to malaria and to the investigation of soil pollution. Malaria researches were carried out by Dr. Paul Russell of the Foundation in the laboratory of the Pasteur Institute at Coonoor. Studies were made on sporozoites of *P. gallinaceum*. Field surveys were undertaken in fifteen villages in the neighbouring foothills. The mosquito vector was shown to be *A. fluviatilis* and this mosquito has been shown to exist in other parts of the Western Ghats also and to be highly susceptible to infection. Other researches in malaria were in progress at Pattukkottai in the Tanjore district of Madras Presidency. Ecological studies in respect of *A. culicifacies* were undertaken in an irrigated area in which malaria is widely prevalent as well as in another irrigated area where the disease does not exist. The investigations included medical studies on school children and studies on irrigation methods in relation to the incidence of malaria, and the effect of spraying of adult mosquitoes in controlling the disease.

As regards soil sanitation, researches on ground waters which had been in progress for some time at Lahore were concluded in June 1940. This work showed that fœcal pollution did not travel ten feet from the source in the type of soil in which the experiment was carried out. This work was undertaken in order to determine the possible limits of contamination of water supplies from bored hole latrines. Similar studies have been started in the Singur health unit area in Bengal but were not completed by the end of the year.

As regards public health education there was a considerable curtailment in the number of scholarships awarded by the Foundation as a result of the war and the consequent difficulties of sea travel. Only two fellowships were awarded during the year. In addition four travel grants were awarded to the members of the staff of the All-India Institute of Hygiene and Public Health, Calcutta, for study tours in India and Ceylon. Five fellows returned from foreign study.

Dr. J. B. Grant of the Foundation continued to be the Director of the All-India Institute of Hygiene and Public Health, Calcutta, his services having been lent to the Government of India for a further period of one year from 1st July 1940. Pending the selection of a suitable candidate for the post of the Professor of Sanitary Engineering at the Institute, Mr. B. R. Dyer of the Foundation staff was lent to the Institute in January 1940 to act as Professor of Sanitary Engineering in addition to his other duties.

Brief accounts of the activities of the Tuberculosis Association of India and of the British Empire Leprosy Relief Association have been given in the paragraphs dealing with tuberculosis and leprosy in section II of this report.

NEW DELHI;
The 1st August, 1941.

E. COTTER, LIEUT.-COLONEL, I.M.S.,
Public Health Commissioner with the Government of India.

GIPD—M—191 PHC—14-10-41—1,300.

00134481

Digitized with financial assistance from

Government of Maharashtra

on 01 February, 2020